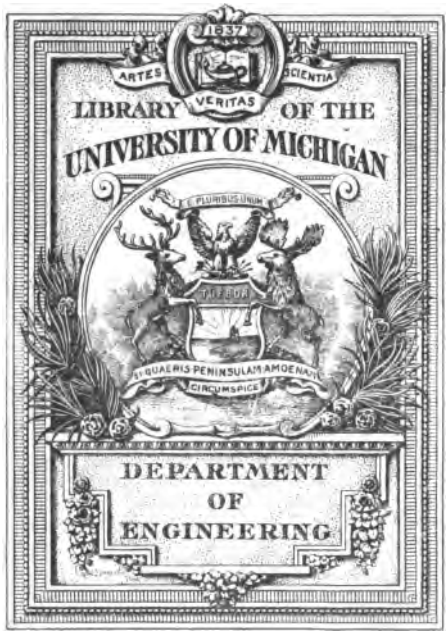
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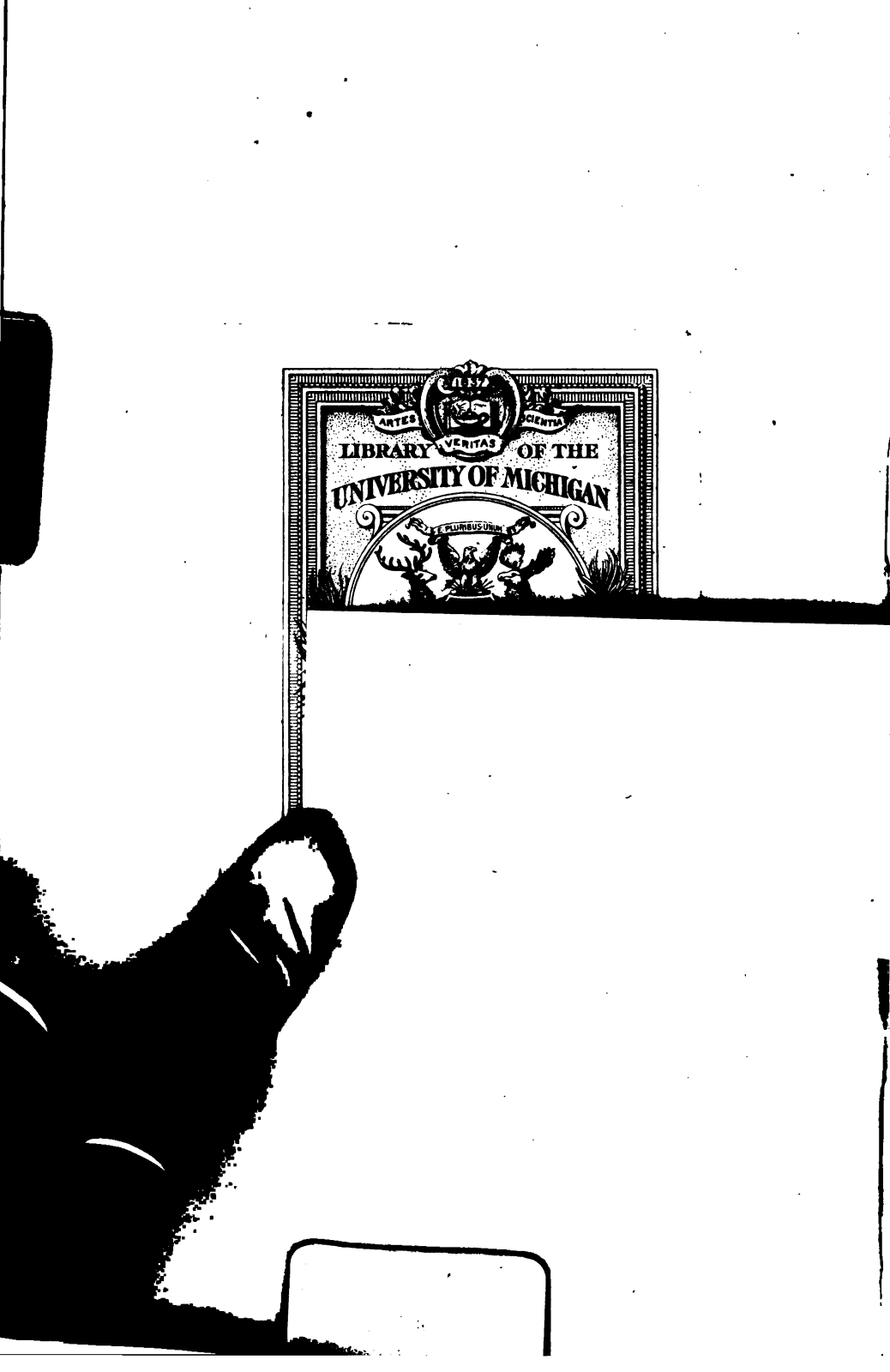
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THE NEW STEAM TABLES

THE NEW STEAM TABLES

TOGETHER WITH THEIR DERIVATION AND APPLICATION

BY

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PREFACE

THE following tables, together with the explanation of how the values have been calculated, are published in the hope that they will be of use to English engineers and students. The work has been based upon the researches of Professor H. L. Callendar, the importance of which does not seem to have been fully realised by engineers of this country and America. On the Continent Mollier has used it to compile tables in the metric system of units. Sir Alfred Ewing, in the latest edition of his book (1910), "The Steam Engine and Other Heat Engines," was the first English engineer to draw attention to the importance of Callendar's and Mollier's work. The authors gratefully acknowledge that the perusal of that new edition gave them the idea of going more fully into the subject. Although Mollier's values are given in that work, it was thought that more complete tables were needed.

It should be stated that these tables were calculated, originally, from Callendar's equations. Mollier's steam tables were not consulted until the final stage of proof correction. It was then suggested that the results should be checked against Mollier's, when it was possible to do so. (The values obtained by the authors had been checked several times, and appeared, by differences, to be reasonable.) On making comparisons with Mollier's tables—by translating the units—a few unimportant divergences were noted. In most cases the authors felt it right to bring their values into line with those of Mollier to avoid confusion of thought by anyone unable to appreciate the insignificance of the small divergences.

It is especially desired to thank Sir Alfred Ewing, K.C.B., for consenting to write the introduction to these tables, and for several suggestions which he has made. It is also desired to thank Professor Callendar for the trouble which he has taken, and for his uniform kindness.

It is only right to add that the Pound-Fahrenheit tables have been included because engineers still use them—not because the system is commended. It is to be sincerely hoped that all students will use the Pound-Centigrade tables, as there is no advantage, and several drawbacks, in using the Fahrenheit scale of temperature. It will undoubtedly gradually go out of use in this country.

At the end of the book will be found a chart representing the Total Heat of Steam on an entropy base. This graphical means of representing the properties of steam is due to Mollier and a reproduction of his diagram appears in Ewing's "The Steam Engine and Other Heat Engines." It already has an extensive use in connection with problems on steam turbines. It is here plotted in English Units.

C. A. M. S.
A. G. W.

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INTRODUCTION

By Sir J. Alfred Ewing, K.C.B., F.R.S.

Professor Smith has asked me to write a brief introduction to the Steam Tables which he and Mr. Warren have prepared, and I willingly do so because it may be expected that this publication will do something towards making engineers better acquainted with the important service which Callendar has rendered them in supplying materials for a new determination of the properties of steam, and towards facilitating the use of correct values in steam calculations.

As I have already pointed out, in the Third Edition of my book on "The Steam Engine and Other Heat Engines" (1910), the steam tables which have for many years been generally accepted contain serious errors and inconsistencies. Professor Callendar has shown how tables may be calculated which escape these inconsistencies and give figures that are in agreement with the best experimental data. To quote from the account of his work given in the Appendix to my book:—

"He assumed a characteristic equation connecting pressure, volume and temperature, applicable to water-vapour generally whether saturated or superheated. This equation involves certain constants, and he adjusted these to accord with well-established results of experiment. He proceeded to show that it was practicable to deduce from the characteristic equation, in the form assumed by him, by aid of relations depending only on the general principles of thermodynamics, expressions for all the important properties of steam, from which numerical values could be deduced within the range to which the characteristic equation might be held applicable, namely, for pressures such as correspond to saturation temperatures extending from 0° to 200° C. or so. Within this range the values so deduced are found

to agree remarkably well with the results of such direct measurements as have been made, especially with those in which there are good grounds for believing the experiments to be accurate. At the time when Callendar devised his equation there was comparatively little material for such a comparison; but now, thanks especially to measurements of the volume and specific heat of steam carried out for the most part in the Laboratory of Technical Physics at Munich, there is considerably more. The new data go to confirm the general correctness of Callendar's method, and to establish the conclusion that the values derived from his equation may be accepted with confidence for the purposes of engineering calculation within the stated range, which, moreover, is the range usual in engineering practice. These values have the great advantage of being thermodynamically consistent with one another, which cannot be said of the numbers in the older steam tables. For pressures such as correspond to saturation temperatures much beyond 200° C., experiments are lacking, and it may be expected that the Callendar equation will not apply to them with so high a degree of approximation as it does for pressures within the usual range."

To Professor Mollier of Dresden, who has made many valuable contributions to technical thermodynamics, belongs the distinction of being the first to appreciate the practical importance of Callendar's work. In 1906 he published a set of steam tables which were calculated by means of formulæ derived according to the method of Callendar. These tables gave numerical values, in metric units, of all the chief properties of saturated steam. Mollier also devised convenient means of exhibiting the properties of steam graphically, and included in his publication two most useful charts in which, by means of systems of lines, the properties of superheated, as well as saturated, steam are represented on a scale suitable for engineering requirements. By permission of Professor Mollier I reproduced his tables and charts in the book referred to above, making only a few additions to the tables with the view of adapting them to the needs of English students.

Once a student has learnt the use of such charts they are more valuable to him than any numerical tables. They are far more comprehensive as a statement of facts about steam, for they give continuous values and they include the region of superheat

—a region of much importance now that steam is commonly used in the superheated state. They enable the student to follow a process graphically with a better understanding of all its stages; moreover, many practical problems are solved by measurement from the chart with much less expenditure of time and trouble than would be needed in numerical calculations using data furnished in the columns of a table.

Messrs. Smith and Warren have independently applied the same methods of calculation, founded on Callendar's work, as were applied by Mollier, but using English units. Their results agree in all material particulars with Mollier's. If small differences are found here and there, they are due to a slightly different adjustment of the various constants which enter into the formulæ, or to steps of the calculation being carried out with a greater or less number of significant figures, and are in no case of practical consequence so far as engineering uses of the tables are concerned. It is to be hoped that with the additional assistance these tables supply, English engineers and students will realise that the new method of calculation should be adopted and the tables and formulæ of the old text-books be abandoned as obsolete.

The authors have, at my suggestion, adopted I as the symbol for "total heat" in the sense used by Callendar and Mollier, which is different from the sense in which the phrase "total heat" was used by Rankine and other early writers. Rankine's total heat of steam (usually written as H) was the heat required for its formation under constant pressure, starting from the state of water at 0° C. It was made up of first, the heat required to raise the water from 0° C. to the temperature at which steam was formed, and secondly, the "latent heat" taken in at that temperature in changing from water to steam. The new "total heat" I comprises these two quantities and also a third one, namely, the heat-equivalent of the work which would be spent in forcing the water (at 0° C.) into a vessel under the constant pressure at which steam is to be formed. This term is a small one: the numerical values of I are therefore only slightly greater than those of H; but the difference in definition is very important. The total heat I under the new definition is a function of much greater convenience in thermodynamic

calculations. Students will be less liable to confuse the two quantities when they have a different symbol for the new total heat from that which was generally used to express total heat in its old meaning.

The authors have included a set of tables in which the Fahrenheit scale of temperature is employed. This may be a prudent concession to national bad habits, but students cannot be too strongly urged to accustom themselves to the use of the Centigrade scale in all steam calculations. "To adhere to Fahrenheit degrees and the quantities dependent on them is to maintain a wholly unnecessary and exceedingly inconvenient barrier, not only between applied science and the science of the physical laboratory, but also between the engineering of England and that of other countries."

J. A. E.

November, 1912.

THE NEW STEAM TABLES

DERIVATION AND APPLICATION.

UNTIL quite recently steam tables have been calculated from a number of purely empirical formulæ based entirely upon experimental data. The thermodynamic relations existing between the various quantities were unrecognised by the earlier investigators. All the experimental errors were introduced, and the tables so compiled contained many inconsistencies. These have been exposed by the researches of Callendar,* upon whose work the present steam tables are founded.

Callendar developed the Joule-Thomson equation, and gave it in such a form as to represent accurately the properties of steam, whether superheated or saturated. Further, he demonstrated the thermodynamic relations existing between the various properties and deduced accurate formulæ for the calculation of quantities previously represented empirically. Such a method of attack renders the tables *consistent*. Subsequent research substantiated generally Callendar's deductions, and suggested slight adjustments of the experimentally determined constants. Mollier utilised Callendar's work. He made calculations and published tables, using the Continental units. The tables following represent the properties of steam, calculated in a similar manner, and given in English units. The fundamental equation, given by Callendar, connecting pressure volume and temperature is assumed. The immediate object is to deduce the formulæ from which the properties have been calculated, starting from the most elementary considerations in thermodynamics. The importance of the work has been accentuated by the development of the steam turbine. In nearly all calculations in which tables are used small differences of

* "On the Thermodynamical Properties of Gases and Vapours as deduced from a Modified Form of the Joule-Thomson Equation, with Special Reference to the Properties of Steam." H. L. Callendar, Proc. Roy. Soc., Vol. lxvii., 1900.

large quantities are dealt with. It is, therefore, more important that the tables should be *consistent* than that the *absolute* values of the quantities represented should be exact. For this reason, therefore, calculations are made to more significant figures than can be experimentally verified. This is permissible, for absolute errors made in the quantities cancel out in the differences. We thus obtain the differences to a greater accuracy than the absolute values.

Equations for Gases.—In a fluid we have three variables (pressure, volume and temperature), of which any two define the third. Taking p as the pressure, v the volume and θ the absolute temperature, we have the well-known relation for a perfect gas (when the volume is large) $pv = \mathrm{R}\,\theta$. Various equations have been suggested to represent the deviations of vapours from this simple law. One suggested by Rankine in 1854 for CO_2 was

$$pv = \mathrm{R}\,\theta - \frac{a}{\theta v} \qquad (1)$$

Joule and Thomson subsequently modified this formula and wrote the equation in the form

$$v = \frac{\mathrm{R}\,\theta}{p} - \frac{a}{\mathrm{R}\,\theta^2} \qquad (2)$$

The final form of the equation, as given by Callendar, is

$$v - b = \frac{\mathrm{R}\,\theta}{p} - c_o\left(\frac{\theta_o}{\theta}\right)^n = \mathrm{V} - c \qquad (3)$$

The basis of this formula is, perhaps, best explained by quoting Callendar himself.*

"It is practically certain that the equation of a perfect, or plu-perfect, gas at high temperatures is not $pv = \mathrm{R}\,\theta$, but $p\,(v-b) = \mathrm{R}\,\theta$, where b is the minimum volume or 'co-volume' of Hirn and Van der Waals. The co-volume b is variously regarded as being equal to four times or $4\sqrt{2}$ times the absolute volume of the molecules. It is relatively small at moderate pressures (about one-thousandth of v at atmospheric pressure), and is often negligible, but may with great probability be taken as equal to the volume of the liquid at temperatures where the vapour pressure is small.

* Ibid.—pp. 269, 270.

"It is usual in the kinetic theory of gases, either tacitly or explicitly, to make the fundamental assumption that the average total kinetic energy of the molecules of a gas, including motions of vibration or rotation, is directly proportional to the kinetic energy of translation, which is equal to $\frac{3\,p\,v}{2}$ per unit mass at any temperature. It follows, from this assumption, that the limiting value of the specific heat of a gas in the ideal state ($p = o, v = \infty$), either at constant pressure or at constant volume, must be constant, if the molecule is stable, since it is directly proportional to $\frac{p\,v}{\theta}$, which tends to a constant limit when $p = o$, even in the case of vapours at temperatures far below their boiling points. These constant limiting values of the two fundamental specific heats will be denoted by the symbols* K_{po} and K_{vo} respectively. As a further simplification we may assume that the kinetic energy of a vapour is proportional to $p(v-b)$ at all stages and not only in the limit. On this assumption it is also necessary to suppose that the index of θ in the small term $\frac{a}{R\,\theta^2}$ in the Joule-Thomson equation is not 2 but $n = \frac{J\,K_{vo}}{R}$, the ratio of the limiting value of the specific heat at constant volume to the limiting value of $\frac{p\,v}{\theta}$. If we adopt the hypothesis of Clerk Maxwell with regard to the distribution of energy between the various degrees of freedom of a molecule, which, in the absence of certain knowledge with regard to the exact nature of a molecule, appears to be the only practical working hypothesis, the theoretical value of this limiting ratio should be 1·5 for a monatomic gas like argon, 2·5 for a diatomic gas like oxygen and hydrogen, 3·5 for a triatomic gas like steam or CO_2, and so on, increasing by unity for each additional atom in the molecule. The value 3·5 for the index is closely verified in the case of steam by the experiments to be described on the Joule-Thomson effect, and also by the experiments on the specific heat, by which this relation was first suggested."

* New symbols are here substituted for those used by Callendar.

"Adopting these two modifications, of which the second is the more important, the equation may be written in the form shown above (equation 3), in which v is taken as a convenient abbreviation for the ideal volume $\frac{R\theta}{p}$, and the co-volume b is taken as constant and equal to the volume of the liquid. The small correction c, representing the state of co-aggregation of the molecules, is called the "co-aggregation volume," and is a function of the temperature only, varying inversely as the n-th power of the absolute temperature, where the index n is used as an abbreviation for $\frac{J K_{vo}}{R}$. It is a quantity of the same dimensions as a volume."

We are solely concerned with steam, in which case the constant n is taken as $\frac{10}{3}$. This value is the modification of 3·5 made by Callendar (since confirmed by further research) to bring the results closer into line with experimental data. The constant b (the co-volume) is taken as ·01602 cubic feet, being the volume of 1 lb. of water at a low temperature when the pressure is small. The value of the constant R is determined from the molecular weight of water, and is taken as 154·1 (temperature measured in °C.).

Thermodynamics of Steam.—In order to develop the thermodynamics we shall have to make considerable use of simple partial differential equations. It is therefore advisable to state one or two fundamental facts concerning them.

Suppose we have any three quantities, u, x and y, such that any two determine the third, then we have

$$du = \left(\frac{du}{dx}\right)_y dx + \left(\frac{du}{dy}\right)_x dy \qquad (4)$$

Illustration.

If $PV = R\theta$ then $d\theta = \left(\frac{d\theta}{dP}\right)_v dP + \left(\frac{d\theta}{dV}\right)_p dV$

$$= \frac{V}{R} . dP + \frac{P}{R} dV.$$

Further, the existence of such a condition as above (equation 4) is a proof* that u is a function of x and y, and always returns to

* See Perry's "Calculus for Engineers," pp. 142–143.

the same value when x and y return to their original values. Since $\left(\frac{d^2u}{dy\,.\,dx}\right) = \left(\frac{d^2u}{dx\,.\,dy}\right)$ we have if u is a function of x and y, and $du = K\,dx + B\,dy$, then $K = \left(\frac{du}{dx}\right)_y$ and $B = \left(\frac{du}{dy}\right)_x$, and therefore

$$\left(\frac{dK}{dy}\right) = \left(\frac{dB}{dx}\right) \tag{5}$$

The application of this follows. Since the state of a gas is completely defined by two of the three variables we have, during any small addition of heat, dI,

$$dI = K\,d\theta + B\,dv \tag{6}$$
$$= C\,d\theta + D\,dp \tag{7}$$
$$= E\,dp + F\,dv, \tag{8}$$

where K, B, C, D, E and F are all functions of the state of the stuff. If E is the internal energy, we have

$$dE = dI - jp\,.\,dv, \tag{9}$$

where j is the reciprocal of Joule's equivalent. Now, from the first law of thermodynamics, dE is a complete differential. Substituting for dI from (6), we obtain

$$dE = K\,d\theta + (B - jp)\,dv. \tag{10}$$

Applying (5)

$$\left(\frac{dK}{dv}\right)_\theta = \left(\frac{d(B-jp)}{d\theta}\right)_v$$

$$\left(\frac{dK}{dv}\right)_\theta = \left(\frac{dB}{d\theta}\right)_v - j\left(\frac{dp}{d\theta}\right)_v \tag{11}$$

Also
$$dE = dI - jp\,.\,dv$$
$$= C\,d\theta + D\,dp - jp\,dv,$$

but
$$dv = \left(\frac{dv}{d\theta}\right)_p d\theta + \left(\frac{dv}{dp}\right)_v dp$$

whence $dE = d\theta\left\{C - jp\left(\frac{dv}{d\theta}\right)_p\right\} + dp\left\{D - jp\left(\frac{dv}{dp}\right)\right\}$

Again applying (5)

$$\left(\frac{dc}{dp}\right)_\theta - j\left(\frac{dv}{d\theta}\right)_p - jp\left(\frac{d^2v}{dp\,.\,d\theta}\right) = \left(\frac{dD}{d\theta}\right)_p - jp\left(\frac{d^2v}{d\theta\,.\,dp}\right)$$

or
$$\left(\frac{dC}{dp}\right)_\theta - \left(\frac{dD}{d\theta}\right)_p = j\left(\frac{dv}{d\theta}\right)_p \tag{12}$$

If ϕ is the entropy we have

$$d\phi = \frac{dI}{\theta} = \frac{K}{\theta}d\theta + \frac{B}{\theta}dv,$$

$$\therefore \quad \frac{1}{\theta}\left(\frac{dK}{dv}\right)_\theta = \frac{1}{\theta}\left(\frac{dB}{d\theta}\right)_v - \frac{B}{\theta^2}$$

or
$$\left(\frac{dK}{dv}\right)_\theta = \left(\frac{dB}{d\theta}\right)_v - \frac{B}{\theta}. \tag{13}$$

From (11) and (13)

$$\frac{B}{\theta} = j\left(\frac{dp}{d\theta}\right)_v. \tag{14}$$

Partially differentiating (14) with respect to θ, considering v constant, we have

$$\frac{1}{\theta}\left(\frac{dB}{d\theta}\right)_v - \frac{B}{\theta^2} = j\left(\frac{d^2p}{d\theta^2}\right)_v = \frac{1}{\theta}\left(\frac{dK}{dv}\right)_\theta \text{ from (13)}$$

or
$$\left(\frac{dK}{dv}\right)_\theta = j\theta\left(\frac{d^2p}{d\theta^2}\right)_v. \tag{15}$$

Also from (7)

$$d\phi = \frac{C}{\theta}d\theta + \frac{D}{\theta}dp,$$

$$\therefore \quad \frac{1}{\theta}\left(\frac{dC}{dp}\right)_\theta = \frac{1}{\theta}\left(\frac{dD}{d\theta}\right)_p - \frac{D}{\theta^2}$$

or
$$\left(\frac{dC}{dp}\right)_\theta = \left(\frac{dD}{d\theta}\right)_p - \frac{D}{\theta}. \tag{16}$$

From (12)

$$\left(\frac{dC}{dp}\right)_\theta = \left(\frac{dD}{d\theta}\right)_p + j\left(\frac{dv}{d\theta}\right)_p.$$

Hence
$$j\left(\frac{dv}{d\theta}\right)_p = -\frac{D}{\theta}. \tag{17}$$

Partially differentiating (17) with respect to θ, p being considered constant, we have

$$j^p\left(\frac{d^2v}{d\theta^2}\right)_p = \frac{D}{\theta^2} - \frac{1}{\theta}\left(\frac{dD}{d\theta}\right)_p = -\frac{1}{\theta}\left(\frac{dC}{dp}\right)_\theta \text{ from (16),}$$

or
$$\left(\frac{dC}{dp}\right)_\theta = -j\theta\left(\frac{d^2v}{d\theta^2}\right)_p. \tag{18}$$

Equations (15) and (16) are the two fundamental equations from which Callendar has derived the whole of the properties of steam. It will be noticed that in a constant volume change of state K equals the addition of heat divided by the increase of

temperature, or it is the specific heat at constant volume ($K = K_v$). Similarly $C = K_p$.

Let us apply equation (18) to (3).

We have $$v - b = \frac{R\theta}{p} - c_0\left(\frac{\theta_0}{\theta}\right)^n = V - c.$$

whence $$\left(\frac{d^2 v}{d\theta^2}\right)_p = -\frac{n(n+1)c}{\theta^2}$$

$$-j\theta\left(\frac{d^2 v}{d\theta^2}\right)_p = \frac{n(n+1)cj}{\theta} = \left(\frac{dC}{dp}\right)_\theta.$$

Integrating we have

$$K_p = C = K_{po} + \frac{n(n+1)cjp}{\theta}. \tag{19}$$

where K_{po} is the constant of integration, and is the limiting value of K_p when the pressure is zero.

We have also from (3)

$$pV = R\theta, \tag{20}$$

whence $$V\left(\frac{dp}{d\theta}\right)_v + p\left(\frac{dV}{d\theta}\right)_v = R \tag{21}$$

and $$V\left(\frac{d^2 p}{d\theta^2}\right)_v + 2\left(\frac{dV}{d\theta}\right)_v\left(\frac{dp}{d\theta}\right)_v + p\left(\frac{d^2 V}{d\theta^2}\right)_v = 0 \tag{22}$$

but $$\left(\frac{dV}{d\theta}\right)_v = -\frac{nc}{\theta}, \tag{23}$$

and hence from (21) $$\left(\frac{dp}{d\theta}\right)_v = \frac{p}{V\theta}(V + nc). \tag{24}$$

Also $$\left(\frac{d^2 V}{d\theta^2}\right)_v = \frac{n(n+1)c}{\theta^2}. \tag{25}$$

Substituting from (23), (24) and (25) in (22) we obtain

$$V\left(\frac{d^2 p}{d\theta^2}\right)_v = \frac{pc}{\theta^2}\left(\frac{2n^2 c}{V} + n - n^2\right)$$

$$j\theta\left(\frac{d^2 p}{d\theta^2}\right)_v = jRc\left(\frac{2n^2 c}{V^3} - \frac{n^2 - n}{V^2}\right) = \left(\frac{dK_v}{dv}\right)_\theta$$

$$= j\left(\frac{dK_v}{dV}\right)_\theta \text{ from (15).} \tag{26}$$

Integrating

$$K_v = \int jRc\left(\frac{2n^2}{V^3} - \frac{n^2 - n}{V^2}\right) dV,$$

$$= K_{vo} + \frac{n^2 - n}{V} jRc - \frac{n^2 c}{V} jRc,$$

but $$nR = JK_{vo}.$$

Hence
$$K_v = K_{vo}\left\{1 + \frac{n\,c}{V} - \frac{c}{V} - \frac{n\,c^2}{V^2}\right\}$$
$$= K_{vo}\left\{1 + \frac{n\,c}{V}\right\}\left\{1 - \frac{c}{V}\right\}. \qquad (27)$$

The value of c may be calculated for any temperature if known for one, since

$$c = c_0\left(\frac{\theta_0}{\theta}\right)^n. \qquad (28)$$

Both c and n may be determined by the measurement of the fall in temperature per unit drop in pressure when steam passes through a restricted orifice. The theory is as follows:

From (7) and (17) we have

$$\left(\frac{d\,I}{d\,p}\right)_\theta = D = -\,\theta\,j\left(\frac{d\,v}{d\,\theta}\right)_p. \qquad (29)$$

If I is the total heat of steam then

$$I_t = E + j\,p\,v \qquad (30)$$

whence
$$d\,I_t = d\,E + j\,d\,(p\,v)$$
$$= d\,E + j\,v\,d\,p + j\,p\,d\,v$$
$$= d\,I + j\,v\,d\,p$$
$$= \left(\frac{d\,I}{d\,\theta}\right)_p d\,\theta + \left(\frac{d\,I}{d\,p}\right)_\theta d\,p + j\,v\,d\,p$$
$$= K_p\,d\,\theta - \left\{\theta\,j\left(\frac{d\,v}{d\,\theta}\right)_p - j\,v\right\} d\,p \text{ from (29).}$$

In expansion through a restricted orifice the total heat is constant, *i.e.*, $d\,I_t = 0$.

Hence
$$K_p\left(\frac{d\,\theta}{d\,p}\right)_I = \theta\,j\left(\frac{d\,v}{d\,\theta}\right)_p - j\,v. \qquad (31)$$

Applying (31) to (3) we obtain

$$K_p\left(\frac{d\,\theta}{d\,p}\right)_{I_t} = \theta\,j\left(\frac{R}{p} + \frac{n\,c}{\theta}\right) - j\,v$$
$$= j\,(v - b + c + n\,c) - j\,v$$
$$= j\,(n+1)\,c - j\,b. \qquad (32)$$

whence n and c can be found experimentally.

As before stated n is taken as $\frac{10}{3}$; c_o is taken as 1·2014 cub. ft.

Since $K_{vo} = n\,j\,R$ and $K_{po} = K_{vo} + j\,R$ it follows that $K_{vo} = \cdot 367$ and $K_{po} = \cdot 477$.

Isothermal change from pressure p_0 to p_1 at temperature θ_0.—Defining the change in state by the variables p and θ we have for an isothermal

$$d\phi = \left(\frac{d\phi}{dp}\right)_\theta dp$$

but $$d\phi = \frac{dI}{\theta} = \frac{C}{\theta} d\theta + \frac{D}{\theta} dp \text{ from (7).}$$

Since $d\theta = 0$ we have $\left(\frac{d\phi}{dp}\right)_\theta = \frac{D}{\theta} = -j\left(\frac{dv}{d\theta}\right)_p$ from (17).

Whence $$d\phi = -j\left(\frac{dv}{d\theta}\right)_p dp = -j\left(\frac{R}{p} + \frac{n c_0}{\theta_0}\right) dp \qquad (33)$$

$$\therefore \quad \phi_1 - \phi_0 = j\int_{p_0}^{p_1}\left(-\frac{R}{p} dp - \frac{n c_o}{\theta_0} dp\right)$$

$$= R j \log_e \frac{p_0}{p_1} + \frac{n c_o j}{\theta_0}(p_0 - p_1). \qquad (34)$$

The heat added $I_1 - I_0 = \theta_0(\phi_1 - \phi_0)$

$$= R j \theta_0 \log_e \frac{p_0}{p_1} + n c_o j (p_0 - p_1). \qquad (35)$$

The work done $$W = \int_{v_0}^{v_1} p\, dv$$

$$= \int_{v_0}^{v_1} \frac{R\theta_0}{v - b + c_0} dv$$

$$= \Big[R\,\theta_0 \log_e (v - b + c_0)\Big]_{v_0}^{v_1}$$

$$= R\,\theta_0 \log_e \frac{p_0}{p_1} \text{ ft. lbs.}$$

$$= R j\, \theta_0 \log_e \frac{p_0}{p_1} \text{ lb. calories.} \qquad (36)$$

$\therefore$ The change of internal energy

$$E_1 - E_0 = n c_o j (p_0 - p_1) \text{ lb. calories.}$$

Constant pressure change from temperature θ_1 to θ_2 at pressure p_1.

The heat added $$I_2 - I_1 = \int_{\theta_1}^{\theta_2} K_p\, d\theta$$

$$= \int_{\theta_1}^{\theta_2} K_{po}\, d\theta + n(n+1) j p_1 \int_{\theta_1}^{\theta_2} \frac{c}{\theta} d\theta$$

$$= K_{po}(\theta_2 - \theta_1) + (n+1) j p_1 (c_1 - c_2). \qquad (37)$$

The work done $W = \int_{v_1}^{v_2} p_1 \, dv = p_1 (v_2 - v_1)$

$$= R (\theta_2 - \theta_1) + p_1 (c_1 - c_2) \text{ ft. lbs.} \quad (38)$$

Whence change of internal energy

$$E_2 - E_1 = K_{vo} (\theta_2 - \theta_1) + n j p_1 (c_1 - c_2) \quad (39)$$

The change of entropy $(\phi_2 - \phi_1) = \int_{\theta_1}^{\theta_2} K_{po} \frac{d\theta}{\theta}$

$$= K_{po} \log_e \frac{\theta_2}{\theta_1} + n p_1 \left(\frac{c_1}{\theta_1} - \frac{c_2}{\theta_2} \right). \quad (40)$$

Any change in state from $p_0 v_0 \theta_0$ to a state $p_2 v_2 \theta_2$ may be considered as made up of an isothermal change and of a constant pressure change. The change of internal energy and of entropy is independent of the path.

Noting that $\theta_0 = \theta_1$, $c_0 = c_1$, and $p_1 = p_2$ we have

$$E_2 - E_0 = K_{vo} (\theta_2 - \theta_0) + n j (p_0 c_0 - p_2 c_2) \quad (41)$$

and $(\phi_2 - \phi_0) = K_{po} \log_e \frac{\theta_2}{\theta_0} - j R \log_e \frac{p_2}{p_0} - n j \left(\frac{p_2 c_2}{\theta_2} - \frac{p_0 c_0}{\theta_0} \right)$. (42)

Measuring both the internal energy and the entropy from 0^0 C we may conveniently write these expressions—

$$E = K_{vo} T - n j p c + \text{const.} \quad (43)$$

and $$\phi = K_{po} \log_e \theta - j R \log_e p - \frac{n j p c}{\theta} + \text{const.} \quad (44)$$

The total heat $I = E + j p v$

$$= K_{vo} T - n j p c + j p \left(\frac{R \theta}{p} - c + b \right) + \text{const.}$$

$$= K_{vo} T + j R T - j p c (n + 1) + j p b + \text{const.}$$

$$= K_{po} T - j p \{ (n + 1) c - b \} + \text{const.} \quad (45)$$

The constants of integration can be found from experimental results. For instance, in equation (45) we may take $T = 100^\circ$ C., $p = 14{\cdot}7 \times 144$ lbs. square foot, and $I = 639{\cdot}6$. Putting in these values we have

$$639{\cdot}6 = 47{\cdot}7 - \frac{14{\cdot}7 \times 144}{1{,}400} \left\{ \frac{13}{3} \left(\frac{273}{373} \right)^{\frac{10}{3}} \times 1{\cdot}2014 - 0{\cdot}01602 \right\}$$

$+$ const. whence the constant $= 594{\cdot}7$.

Further, ϕ for saturated steam is equal to $\phi_w + \frac{L}{\theta}$. From the determination of ϕ_w (given later) and of L, determined experi-

mentally, we may assign the value 1·759 to the entropy of saturated steam at 100° C. Whence from equation (44)

$$1{\cdot}759 = {\cdot}477 \log_e 373 - \frac{154{\cdot}1}{1400} \log_e 14{\cdot}7 \times 144 - \frac{10 \times 14{\cdot}7 \times 144}{3 \times 1400} \times \left(\frac{273}{373}\right)^{\frac{10}{3}} \times \frac{1{\cdot}2014}{373} + \text{const.}$$

from which the const. $= -0{\cdot}217$.

Similarly the constant in equation (43) is 564·6.

Mollier has put these expressions into a more convenient form for the purposes of numerical calculations. In place of $j\{(n+1)c - b\}$ and $\frac{n\,c\,j}{\theta}$ he used two single symbols, which, following Ewing's notation, we shall write as Y and Z respectively. Then if values of c, Y and Z are calculated the necessary quantities can be tabulated. We have for the volume of saturated or superheated steam

$$v = 154{\cdot}1 \frac{\theta}{p} - c + {\cdot}0160 \qquad (46)$$

for the total heat,

$$\mathrm{I} = 594{\cdot}7 + 0{\cdot}477\ \mathrm{T} - \mathrm{Y}p \qquad (48)$$

for the entropy,

$$\phi = 0{\cdot}477 \log_e \theta - 0{\cdot}1101 \log_e p - \mathrm{Z}\,p - 0{\cdot}217 \qquad (49)$$

or

$$\phi = 1{\cdot}0984 \log_{10} \theta - 0{\cdot}2535 \log_{10} p - \mathrm{Z}\,p - 0{\cdot}217 \qquad (50)$$

for the internal energy

$$\mathrm{E} = 564{\cdot}6 + 0{\cdot}367\ \mathrm{T} - \frac{10}{3} \times 1400\, c\, p \qquad (51)$$

and for the specific heat at constant pressure

$$\mathrm{K}_p = 0{\cdot}477 + \frac{13}{3}\mathrm{Z}\,p. \qquad (52)$$

The internal energy of water may be calculated sufficiently accurately from Regnault's formula—

$$e = \mathrm{T} + 0{\cdot}00002\ \mathrm{T}^2 + 0{\cdot}0000003\ \mathrm{T}^3 \qquad (53)$$

The total heat of water $i = e + j\,p\,v_w$ (54) where v_w is the volume of 1 lb. of water, and may be taken equal to b (neglecting the compressibility of water). The specific heat of water is obtained by differentiating equation (53). Calling the specific heat s the entropy of water

$$\phi_w = \int_{273}^{\theta} \frac{s\,d\,\theta}{\theta} = 2{\cdot}4319 \log_{10} \frac{\theta}{273} - 0{\cdot}0002057\ \mathrm{T} + 0{\cdot}00000045\ \mathrm{T}^2 \qquad (55)$$

The latent heat $L = I - i$ (56)

$= \theta (\phi_s - \phi_w)$. (57)

Equations (56) and (57) define the relation between pressure and temperature for saturated steam. The relation is, however, so involved that it cannot be practically applied. The method used is to assume the relation between pressure and temperature, to calculate the quantities, and make the necessary adjustments to bring these two relations, (56) and (57) into line.

The Uses of the Steam Tables.

Total Heat of Steam.—In the case of *saturated* steam the total heat (I) can be directly obtained from the tables.

In the case of *initially wet* steam the total heat $= i + x L$ where x is the dryness fraction. Thus at 100 lbs. per square inch, if $x = \cdot 8$ the total heat $= 166 \cdot 2 + \cdot 8 \times 495 \cdot 9 = 562 \cdot 9$ lb.-calories.

In the case of *superheated* steam the total heat $= I + k_a (T_1 - T_2)$ where k_a is the average specific heat from saturation to T_1, the temperature to which the steam is superheated, and $T_2 =$ temperature of saturation. Thus at 100 lbs. per square inch, if $T_1 = 300°$ C., we have from the tables $I = 662 \cdot 1$, $T_2 = 164 \cdot 1°$ C., and $k_a = \cdot 526$. Hence total heat $= 662 \cdot 1 + \cdot 526\ (300 - 164 \cdot 1)$, $= 733 \cdot 6$ lb.-calories.

The Entropy of Steam.—In the case of *saturated* steam the entropy is given in the tables (ϕ_s).

In the case of *initially wet* steam the entropy $= \phi_w + x\ (\phi_s - \phi_w)$. Thus at 100 lbs. per sq. inch, if $x = \cdot 8$ the entropy $= \cdot 476 + \cdot 8\ (1 \cdot 610 - \cdot 476) = 1 \cdot 383$ ranks.

In the case of *superheated* steam the entropy may be calculated from the formula given in the previous chapter. It is, however considerably simpler, and sufficiently accurate, to assume that the entropy $= \phi_s + k_a \log_e \frac{\theta_1}{\theta_2}$ where θ_1 and θ_2 are respectively the absolute temperature of superheat and of saturation. Thus for steam superheated to 300° C. at 100 lbs. per square inch, the entropy $= 1 \cdot 610 + \cdot 526 \log_e \frac{573}{437 \cdot 1} = 1 \cdot 752$.

Throttling of Steam.—When steam is throttled, it can be shown readily that the total heat remains constant. This fact being given, the condition of the steam after throttling can be determined from the tables. Thus steam at 100 lbs. pressure is throttled to a pressure of 40 lbs. per square inch, to find the final condition when the steam is (1) initially saturated; (2) initially 80 per cent. dry; (3) initially superheated to 300° C.

Case 1.—Total heat = 662·1 B.Th.U. The total heat of saturated steam at 30 lbs. per square inch pressure is 651·2. Hence the steam after throttling will be superheated, the superheat being 10·9 B.Th.U. This corresponds roughly to 20° superheat. From the tables we then obtain the value ·521 for the average specific heat. The actual superheat is therefore $\frac{10·9}{·521}$ or 20·9° C. The final temperature is 130·6 + 20·9 = 151·5° C.

Case 2.—The steam is initially 80 per cent. dry, and the total heat is 562·9. This being less than 651·2, the steam will be finally wet. At 40 lbs. pressure $i = 131·7$ and $L = 519·5$. Since the total heat $= i + x$ L we have $121·7 + x \times 519·5 = 562·9$, whence $x = 83·00$ per cent.

Case 3.—The steam is initially superheated to 300° C., and the total heat is 733·6. It will remain superheated and the superheat will be 733·6 − 651·2 or 82·4 B.Th.U. This is roughly 160° C. of superheat, and the specific heat is ·501. The exact superheat is therefore $\frac{82·4}{·501}$ or 164·5° C. The final temperature is therefore 130·6 + 164·5 or 295·1° C.

Adiabatic Flow of Steam.—In any adiabatic change the entropy of the substance is unaltered. This condition suffices for the determination of the state of steam after such a change. Consider the case of steam expanding adiabatically from 100 lbs. per square inch to 40 lbs. per square inch, to find the final state if the steam is (1) initially saturated, (2) initially 80 per cent. dry, (3) initially superheated to 300° F.

Case 1.—The entropy = 1·610 ranks. The entropy of saturated steam at 40 lbs. per square inch = 1·681. Hence after expansion the steam will be wet, and its entropy will be $\phi_w + x(\phi_s - \phi_w)$. At 40 lbs. pressure $\phi_w = ·394$ and $\phi_s = 1·681$. Hence $·394 + x \times 1·287 = 1·610$, whence $x = 94·5$ per cent.

Case 2.—The steam is initially 80 per cent. dry. The entropy = 1·383 ranks. At 40 lbs. pressure we have ·394 + x × 1·287 = 1·383, whence x = 76·8 per cent.

Case 3.—The steam is initially superheated to 300° C., and the entropy = 1·752 ranks. This is greater than the entropy of saturated steam at 40 lbs. per square inch, and hence the steam is still superheated after expansion. The entropy of superheat is 1·752 − 1·681 = ·071 ranks. This corresponds to a superheat to about 190° C., whence k_a (from tables) = ·513. Then ·513 $\log^e \frac{\theta_1}{403{\cdot}6}$ = ·071, whence the exact temperature of superheat = 190·5° C.

It will be noticed that in an adiabatic expansion the steam becomes wetter. This is always the case so long as the steam is initially fairly dry. If the steam is initially very wet it will become dryer on expansion. One example may be added, to find the dryness fraction of steam which on expanding from 100 lbs. per square inch to 40 lbs. per square inch becomes neither wetter nor dryer. We have ·476 + x (1·610 − ·476) = ·394 + x (1·681 − ·394), whence x = 53·6 per cent.

Heat Drop.—In the flow of steam through a channel of varying action, such as a turbine nozzle, the kinetic energy acquired by the steam is equal to the drop in its total heat. If the flow is adiabatic the condition of the steam can be found as above and the change of total heat calculated with the aid of the tables. The Mollier diagram may be conveniently used for this purpose.

Approximate Formulæ.

The following formulæ (for lb.-Centigrade units) are found to hold approximately for temperatures above 100° C.

$$e = \mathrm{T} + {\cdot}00002\,\mathrm{T}^2 + {\cdot}0000003\,\mathrm{T}^3 \qquad (1)$$

$$i = \mathrm{T} + {\cdot}00001\,\mathrm{T}^2 + {\cdot}0000004\,\mathrm{T}^3 \qquad (2)$$

$$\mathrm{I} = 589 + {\cdot}602\,\mathrm{T} - {\cdot}00096\,\mathrm{T}^2 \qquad (3)$$

$$\mathrm{L} = 588 - {\cdot}375\,\mathrm{T} - {\cdot}00114\,\mathrm{T}^2 \qquad (4)$$

$$p\,\mathrm{V}^{1{\cdot}0676} = 491 \qquad (5)$$

$$\log_{10} p = \mathrm{A} - \frac{\mathrm{B}}{\theta} - \frac{\mathrm{C}}{\theta^2}. \qquad (6)$$

where $A = 6{\cdot}10405$

$\log_{10} B = 3{\cdot}1821693$

$\log_{10} C = 5{\cdot}0772011.$

For pressures below atmospheric

$A = 6{\cdot}18123$

$\log_{10} B = 3{\cdot}1977522$

$\log_{10} C = 5{\cdot}0392819.$

$H - L = 1 + {\cdot}977\,T + {\cdot}00018\,T^2$. This quantity should equal h, and it will be found to do so extremely closely over ordinary ranges.

For adiabatic expansion $p\,v^n = C$. Over the range 200 — 40 lbs. square inch for various initial dryness fractions n is given as follows:

x.	n.
1·0	1·144
·9	1·133
·8	1·120
·7	1·102

In *lb.-Fahrenheit* units the formulæ which are found to hold approximately for temperatures above 212° F. are

$e = (T - 32) + {\cdot}000011\,(T - 32)^2 + {\cdot}00000009\,(T - 32)^3$

$i = (T - 32) + {\cdot}000009\,(T - 32)^2 + {\cdot}00000011\,(T - 32)^3$

$I = 1050{\cdot}6 + {\cdot}56\,T - {\cdot}0004\,T^2$

$L = 1080{\cdot}8 - {\cdot}515\,T - {\cdot}0005\,T^2$

$$\log_{10} p = A - \frac{B}{\theta} - \frac{C}{\theta^2}.$$

For pressures above atmosphere

$A = 6{\cdot}10405$

$\log_{10} B = 3{\cdot}4374418$

$\log_{10} C = 5{\cdot}5877461.$

For pressures below atmosphere

$A = 6{\cdot}18123$

$\log_{10} B = 3{\cdot}4530247$

$\log_{10} C = 5{\cdot}5498269.$

TABLE

PROPERTIES OF SATURATED STEAM ON

Pressure in lbs. per square inch. p.	Temperature in degrees Centigrade. T.	Absolute temperature in degrees Centigrade. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in lb.-calories. i.	Internal heat of water in lb.-calories. e.
0·1	1·6	274·6	2937	1·6	1·6
0·2	11·8	284·8	1523	11·8	11·8
0·3	18·1	291·1	1037	18·1	18·1
0·4	22·8	295·8	790·5	22·8	22·8
0·5	26·6	299·6	640·3	26·6	26·6
0·6	29·7	302·7	539·1	29·7	29·7
0·7	32·4	305·4	466·1	32·4	32·4
0·8	34·8	307·8	410·9	34·8	34·8
0·9	37·0	310·0	367·8	37·0	37·0
1·0	38·9	311·9	333·0	39·0	39·0
1·1	40·6	313·6	304·3	40·7	40·7
1·2	42·3	315·3	280·4	42·4	42·4
1·3	43·9	316·9	260·1	44·0	44·0
1·4	45·3	318·3	242·6	45·4	45·4
1·5	46·6	319·6	227·3	46·7	46·7
1·6	47·9	320·9	213·9	48·0	48·0
1·7	49·1	322·1	202·1	49·2	49·2
1·8	50·3	323·3	191·5	50·4	50·4
1·9	51·4	324·4	182·0	51·5	51·5
2·0	52·4	325·4	173·4	52·5	52·5
2·1	53·4	326·4	165·6	53·5	53·5
2·2	54·4	327·4	158·6	54·5	54·5
2·3	55·3	328·3	152·1	55·4	55·4
2·4	56·2	329·2	146·1	56·3	56·3
2·5	57·0	330·0	140·6	57·1	57·1
2·6	57·8	330·8	135·5	57·9	57·9
2·7	58·6	331·6	130·8	58·7	58·7
2·8	59·4	332·4	126·4	59·5	59·5
2·9	60·2	333·2	122·3	60·3	60·3
3·0	60·9	333·9	118·5	61·0	61·0
3·2	62·3	335·3	111·5	62·5	62·5
3·4	63·6	336·6	105·4	63·8	63·8
3·6	64·8	337·8	99·85	65·0	65·0
3·8	66·0	339·0	94·91	66·2	66·2
4·0	67·2	340·2	90·47	67·4	67·4

I.

PRESSURE BASE (**POUND CENTIGRADE** UNITS).

Total heat of steam in lb.-calories. I.	Internal heat of steam in lb.-calories. E.	Latent heat of steam in lb.-calories. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
595·4	565·2	593·8	0·006	2·168	0·1
600·2	568·9	588·4	0·042	2·108	0·2
603·3	571·3	585·2	0·064	2·074	0·3
605·4	572·9	582·6	0·080	2·050	0·4
607·1	574·2	580·5	0·093	2·030	0·5
608·6	575·4	578·9	0·103	2·015	0·6
609·9	576·4	577·5	0·112	2·003	0·7
611·0	577·2	576·2	0·120	1·992	0·8
612·0	578·0	575·0	0·127	1·982	0·9
612·9	578·7	573·9	0·133	1·973	1·0
613·7	579·3	573·0	0·139	1·965	1·1
614·5	579·9	572·1	0·144	1·958	1·2
615·2	580·4	571·2	0·149	1·951	1·3
615·8	580·8	570·4	0·154	1·945	1·4
616·4	581·3	569·7	0·158	1·940	1·5
617·0	581·8	569·0	0·162	1·935	1·6
617·6	582·2	568·4	0·166	1·930	1·7
618·1	582·6	567·7	0·169	1·926	1·8
618·6	583·0	567·1	0·173	1·922	1·9
619·1	583·4	566·6	0·176	1·918	2·0
619·6	583·8	566·1	0·179	1·914	2·1
620·0	584·2	565·6	0·182	1·910	2·2
620·5	584·6	565·1	0·185	1·906	2·3
620·9	584·9	564·7	0·187	1·902	2·4
621·3	585·1	564·2	0·190	1·899	2·5
621·6	585·4	563·7	0·192	1·896	2·6
621·9	585·6	563·2	0·195	1·893	2·7
622·3	585·9	562·8	0·197	1·890	2·8
622·6	586·1	562·3	0·200	1·888	2·9
622·9	586·3	561·9	0·202	1·885	3·0
623·5	586·8	561·0	0·206	1·880	3·2
624·1	587·2	560·3	0·210	1·875	3·4
624·7	587·7	559·7	0·214	1·870	3·6
625·2	588·1	559·0	0·218	1·866	3·8
625·7	588·5	558·3	0·221	1·862	4·0

TABLE I.

PROPERTIES OF SATURATED STEAM ON

Pressure in lbs. per square inch. p.	Temperature in degrees Centigrade. T.	Absolute temperature in degrees Centigrade. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in lb.-calories. i.	Internal heat of water in lb.-calories. e.
4·2	68·3	341·3	86·42	68·5	68·5
4·4	69·4	342·4	82·74	69·6	69·6
4·6	70·4	343·4	79·35	70·6	70·6
4·8	71·4	344·4	76·25	71·6	71·6
5	72·4	345·4	73·39	72·6	72·6
6	76·7	349·7	61·87	77·0	77·0
7	80·5	353·5	53·56	80·8	80·8
8	83·8	356·8	47·27	84·1	84·1
9	86·8	359·8	42·33	87·2	87·2
10	89·6	362·6	38·37	90·0	90·0
11	92·1	365·1	35·09	92·5	92·5
12	94·4	367·4	32·35	94·9	94·9
13	96·6	369·7	30·01	97·1	97·1
14	98·7	371·7	28·01	99·2	99·2
14·7	100·0	373·0	26·75	100·5	100·5
15	100·6	373·6	26·25	101·1	101·1
16	102·4	375·4	24·71	103·0	102·9
17	104·1	377·1	23·35	104·7	104·7
18	105·8	378·8	22·14	106·4	106·4
19	107·3	380·3	21·04	107·9	107·9
20	108·8	381·8	20·06	109·5	109·4
21	110·3	383·3	19·16	111·0	110·9
22	111·7	384·7	18·35	112·4	112·3
23	113·0	386·0	17·60	113·8	113·7
24	114·3	387·3	16·91	115·1	115·0
25	115·5	388·5	16·28	116·3	116·2
26	116·7	389·7	15·70	117·5	117·4
27	117·9	390·9	15·16	118·7	118·6
28	119·1	392·1	14·65	120·0	119·9
29	120·2	393·2	14·18	121·1	121·0
30	121·3	394·3	13·73	122·2	122·1
31	122·3	395·3	13·31	123·2	123·1
32	123·3	396·3	12·92	124·2	124·1
33	124·3	397·3	12·56	125·3	125·2
34	125·3	398·3	12·22	126·3	126·2
35	126·2	399·2	11·89	127·2	127·1

(*continued*).

PRESSURE BASE (**POUND CENTIGRADE** UNITS).

Total heat of steam in lb.-calories. I.	Internal heat of steam in lb.-calories. E.	Latent heat of steam in lb.-calories. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
626·2	588·9	557·7	0·224	1·858	4·2
626·7	589·2	557·1	0·227	1·854	4·4
627·2	589·6	556·6	0·230	1·850	4·6
627·6	589·9	556·0	0·233	1·847	4·8
628·0	590·2	555·4	0·236	1·844	5
629·9	591·7	552·9	0·2483	1·829	6
631·5	592·9	550·7	0·2593	1·817	7
632·9	594·0	548·8	0·2687	1·807	8
634·2	595·0	547·0	0·2771	1·797	9
635·4	595·9	545·4	0·2849	1·789	10
636·5	596·8	544·0	0·2918	1·782	11
637·4	597·5	542·5	0·2983	1·775	12
638·3	598·2	541·2	0·3042	1·768	13
639·1	598·8	539·9	0·3099	1·762	14
639·6	599·1	539·1	0·3136	1·759	14·7
639·9	599·3	538·7	0·3152	1·757	15
640·6	599·9	537·6	0·3200	1·752	16
641·3	600·5	536·6	0·3246	1·748	17
642·0	601·0	535·6	0·3291	1·743	18
642·6	601·5	534·7	0·3331	1·739	19
643·2	602·0	533·7	0·3371	1·735	20
643·8	602·4	532·8	0·3409	1·731	21
644·3	602·8	531·9	0·3446	1·727	22
644·8	603·1	531·1	0·3481	1·724	23
645·3	603·5	530·2	0·3515	1·720	24
645·7	603·8	529·4	0·3548	1·717	25
646·2	604·2	528·6	0·3580	1·714	26
646·6	604·5	527·8	0·3610	1·711	27
647·1	604·9	527·1	0·3639	1·708	28
647·5	605·2	526·4	0·3668	1·705	29
647·9	605·5	525·7	3·3696	1·703	30
648·2	605·8	525·0	0·3723	1·700	31
648·6	606·1	524·4	0·3749	1·698	32
649·0	606·5	523·7	0·3775	1·696	33
649·4	606·7	523·1	0·3800	1·693	34
649·7	606·9	522·5	0·3824	1·691	35

TABLE I.

Properties of Saturated Steam on

Pressure in lbs. per square inch. p.	Temperature in degrees Centigrade. T.	Absolute temperature in degrees Centigrade. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in lb.-calories. i.	Internal heat of water in lb.-calories. e.
36	127·1	400·1	11·58	128·1	128·0
37	128·0	401·0	11·29	129·0	128·9
38	128·9	401·9	11·01	129·9	129·8
39	129·8	402·8	10·74	130·8	130·7
40	130·6	403·6	10·48	131·7	131·6
41	131·4	404·4	10·24	132·5	132·4
42	132·2	405·2	10·00	133·3	133·2
43	133·0	406·0	9·787	134·2	134·1
44	133·8	406·8	9·587	135·0	134·9
45	134·6	407·6	9·393	135·8	135·7
46	135·4	408·4	9·205	136·6	136·5
47	136·2	409·2	9·023	137·4	137·3
48	136·9	409·9	8·847	138·1	138·0
49	137·6	410·6	8·677	138·9	138·8
50	138·3	411·3	8·513	139·6	139·5
51	139·0	412·0	8·354	140·3	140·2
52	139·7	412·7	8·203	141·0	140·9
53	140·4	413·4	8·058	141·7	141·6
54	141·0	414·0	7·918	142·3	141·2
55	141·6	414·6	7·783	142·9	142·8
56	142·3	415·3	7·652	143·6	143·5
57	142·9	415·9	7·526	144·2	144·1
58	143·5	416·5	7·405	144·8	144·7
59	144·1	417·1	7·288	145·5	145·4
60	144·7	417·7	7·175	146·1	146·0
61	145·3	418·3	7·066	146·7	146·6
62	145·9	418·9	6·960	147·3	147·2
63	146·5	419·5	6·857	147·9	147·8
64	147·1	420·1	6·756	148·5	148·4
65	147·6	420·6	6·657	149·1	149·0
66	148·2	421·2	6·561	149·7	149·6
67	148·8	421·8	6·469	150·3	150·2
68	149·4	422·4	6·380	150·9	150·8
69	149·9	422·9	6·294	151·5	151·4
70	150·4	423·4	6·211	152·0	151·9

(*continued*).

PRESSURE BASE (**POUND CENTIGRADE** UNITS.)

Total heat of steam in lb.-calories. I.	Internal heat of steam in lb.-calories. E.	Latent heat of steam in lb.-calories. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
650·0	607·2	521·9	0·3848	1·689	36
650·3	607·4	521·3	0·3871	1·687	37
650·6	607·6	520·7	0·3893	1·685	38
650·9	607·8	520·1	0·3915	1·683	39
651·2	608·0	519·5	0·3936	1·681	40
651·4	608·3	518·9	0·3957	1·679	41
651·7	608·5	518·4	0·3978	1·677	42
652·0	608·7	517·8	0·3998	1·675	43
652·3	608·9	517·3	0·4018	1·673	44
652·6	609·1	516·8	0·4037	1·671	45
652·9	609·3	516·3	0·4056	1·669	46
653·2	609·5	515·8	0·4075	1·668	47
653·4	609·7	515·3	0·4093	1·666	48
653·7	609·9	514·8	0·4111	1·664	49
653·9	610·0	514·3	0·4129	1·663	50
654·1	610·2	513·8	0·4146	1·661	51
654·4	610·4	513·4	0·4163	1·660	52
654·6	610·6	513·0	0·4180	1·658	53
654·8	610·8	512·5	0·4196	1·657	54
655·0	610·9	512·1	0·4212	1·656	55
655·2	611·1	511·6	0·4228	1·654	56
655·4	611·2	511·2	0·4243	1·653	57
655·6	611·4	510·7	0·4258	1·651	58
655·8	611·6	510·3	0·4273	1·650	59
656·0	611·7	509·9	0·4288	1·649	60
656·2	611·9	509·4	0·4303	1·647	61
656·4	612·0	509·0	0·4318	1·646	62
656·6	612·2	508·6	0·4332	1·645	63
656·8	612·3	508·2	0 4346	1·644	64
657·0	612·4	507·8	0·4360	1·643	65
657·1	612·5	507·4	0·4374	1·641	66
657·3	612·7	507·0	0·4387	1·640	67
657·5	612·8	506·6	0·4401	1·639	68
657·7	613·0	506·2	0·4414	1·638	69
657·9	613·1	505·9	0·4427	1·637	70

TABLE I.

PROPERTIES OF SATURATED STEAM ON

Pressure in lbs. per square inch. p.	Temperature in degrees Centigrade. T.	Absolute temperature in degrees Centigrade. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in lb. calories. i.	Internal heat of water in lb.-calories. e.
71	150·9	423·9	6·130	152·5	152·4
72	151·5	424·5	6·051	153·1	153·0
73	152·0	425·0	5·973	153·7	153·6
74	152·5	425·5	5·897	154·2	154·1
75	153·0	426·0	5·822	154·7	154·6
76	153·5	426·5	5·750	155·2	155·1
77	154·0	427·0	5·680	155·7	155·6
78	154·5	427·5	5·612	156·2	156·1
79	155·0	428·0	5·546	156·7	156·6
80	155·4	428·4	5·481	157·1	157·0
81	155·9	428·9	5·417	157·6	157·5
82	156·4	429·4	5·355	158·1	158·0
83	156·9	429·9	5·295	158·6	158·5
84	157·4	430·4	5·236	159·1	159·0
85	157·8	430·8	5·179	159·6	159·5
86	158·3	431·3	5·123	160·1	160·0
87	158·8	431·8	5·068	160·6	160·5
88	159·2	432·2	5·014	161·0	160·9
89	159·6	432·6	4·961	161·5	161·4
90	160·0	433·0	4·908	161·9	161·8
91	160·5	433·5	4·856	162·4	162·3
92	160·9	433·9	4·806	162·8	162·7
93	161·3	434·3	4·758	163·3	163·2
94	161·7	434·7	4·711	163·7	163·6
95	162·1	435·1	4·665	164·1	164·0
96	162·5	435·5	4·620	164·5	164·4
97	162·9	435·9	4·575	164·9	164·8
98	163·3	436·3	4·531	165·4	165·2
99	163·7	436·7	4·488	165·8	165·6
100	164·1	437·1	4·446	166·2	166·0
101	164·5	437·5	4·404	166·6	166·4
102	164·9	437·9	4·363	167·0	166·8
103	165·3	438·3	4·323	167·4	167·2
104	165·7	438·7	4·284	167·8	167·6
105	166·1	439·1	4·246	168·2	168·0

(continued).

PRESSURE BASE (**POUND CENTIGRADE** UNITS).

Total heat of steam in lb.-calories. I.	Internal heat of steam in lb.-calories. E.	Latent heat of steam in lb.-calories. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
658·0	613·3	505·5	0·4440	1·636	71
658·2	613·4	505·1	0·4453	1·635	72
658·4	613·6	504·7	0·4465	1·634	73
658·5	613·7	504·3	0·4478	1·633	74
658·7	613·8	504·0	0·4490	1·632	75
658·8	613·9	503·6	0·4502	1·631	76
659·0	614·0	503·3	0·4514	1·630	77
659·1	614·1	502·9	0·4526	1·629	78
659·3	614·2	502·6	0·4538	1·628	79
659·4	614·3	502·3	0·4550	1·627	80
659·5	614·5	501·9	0·4561	1·626	81
659·7	614·6	501·6	0·4572	1·625	82
659·8	614·7	501·2	0·4583	1·624	83
660·0	614·8	501·9	0·4594	1·623	84
660·2	614·9	500·6	0·4604	1·622	85
660·3	615·0	500·3	0·4615	1·621	86
660·5	615·1	499·9	0·4626	1·620	87
660·6	615·2	499·6	0·4636	1·619	88
660·8	615·3	499·3	0·4647	1·618	89
660·9	615·4	499·0	0·4657	1·618	90
661·0	615·5	498·6	0·4667	1·617	91
661·1	615·6	498·3	0·4677	1·616	92
661·3	615·7	498·0	0·4687	1·615	93
661·4	615·8	497·7	0·4697	1·614	94
661·5	615·9	497·4	0·4707	1·614	95
661·6	616·0	497·1	0·4716	1·613	96
661·7	616·1	496·8	0·4726	1·612	97
661·9	616·2	496·5	0·4736	1·611	98
662·0	616·2	496·2	0·4745	1·610	99
662·1	616·3	495·9	0·4755	1·610	100
662·2	616·4	495·6	0·4764	1·609	101
662·3	616·5	495·3	0·4774	1·608	102
662·4	616·5	495·0	0·4783	1·607	103
662·5	616·6	494·7	0·4792	1·606	104
662·6	616·7	494·4	0·4801	1·606	105

TABLE I.

PROPERTIES OF SATURATED STEAM ON

Pressure in lbs. per square inch. p.	Temperature in degrees Centigrade. T.	Absolute temperature in degrees Centigrade. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in lb.-calories. i.	Internal heat of water in lb.-calories. e.
106	166·5	439·5	4·208	168·6	168·4
107	166·9	439·9	4·171	169·0	168·8
108	167·3	440·3	4·135	169·4	169·2
109	167·7	440·7	4·100	169·8	169·6
110	168·0	441·0	4·065	170·2	170·0
111	168·4	441·4	4·030	170·6	170·4
112	168·8	441·8	3·996	171·0	170·8
113	169·1	442·1	3·963	171·3	171·1
114	169·5	442·5	3·931	171·7	171·5
115	169·8	442·8	3·899	172·0	171·8
116	170·2	443·2	3·867	172·4	172·2
117	170·5	443·5	3·836	172·8	172·6
118	170·9	443·9	3·805	173·2	173·0
119	171·3	444·3	3·775	173·6	173·4
120	171·6	444·6	3·746	173·9	173·7
121	172·0	445·0	3·717	174·3	174·1
122	172·3	445·3	3·688	174·7	174·5
123	172·7	445·7	3·660	175·0	174·8
124	173·0	446·0	3·632	175·4	175·2
125	173·3	446·3	3·605	175·7	175·5
126	173·7	446·7	3·578	176·1	175·9
127	174·0	447·0	3·552	176·4	176·2
128	174·4	447·4	3·526	176·8	176·6
129	174·7	447·7	3·500	177·1	176·9
130	175·0	448·0	3·475	177·4	177·2
131	175·4	448·4	3·450	177·8	177·6
132	175·7	448·7	3·425	178·1	177·9
133	176·0	449·0	3·401	178·5	178·3
134	176·3	449·3	3·377	178·8	178·6
135	176·6	449·6	3·354	179·1	178·9
136	177·0	450·0	3·331	179·5	179·3
137	177·3	450·3	3·308	179·8	179·6
138	177·6	450·6	3·285	180·2	180·0
139	177·9	450·9	3·263	180·5	180·3
140	178·2	451·2	3·241	180·8	180·6

(*continued*).

PRESSURE BASE (**POUND CENTIGRADE** UNITS).

Total heat of steam in lb.-calories. I.	Internal heat of steam in lb.-calories. E.	Latent heat of steam in lb.-calories. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
662·7	616·8	494·1	0·4810	1·605	106
662·8	616·8	493·8	0·4819	1·604	107
662·9	616·9	493·5	0·4828	1·603	108
663·0	617·0	493·2	0·4837	1·602	109
663·1	617·1	492·9	0·4845	1·602	110
663·2	617·2	492·7	0·4854	1·601	111
663·3	617·2	492·4	0·4862	1·601	112
663·4	617·3	492·1	0·4871	1·600	113
663·5	617·4	491·8	0·4880	1·599	114
663·6	617·5	491·6	0·4888	1·599	115
663·7	617·5	491·3	0·4897	1·598	116
663·8	617·6	491·0	0·4905	1·598	117
663·9	617·7	490·7	0·4913	1·597	118
664·0	617·8	490·4	0·4921	1·596	119
664·1	617·8	490·2	0·4929	1·596	120
664·2	617·9	489·9	0·4937	1·595	121
664·3	618·0	489·7	0·4945	1·594	122
664·4	618·1	489·4	0·4953	1·594	123
664·5	618·1	489·1	0·4961	1·593	124
664·6	618·2	488·9	0·4969	1·592	125
664·7	618·3	488·6	0·4977	1·592	126
664·8	618·3	488·4	0·4984	1·591	127
664·9	618·4	488·1	0·4992	1·590	128
665·0	618·5	487·9	0·5000	1·590	129
665·0	618·5	487·6	0·5008	1·589	130
665·1	618·6	487·4	0·5016	1·589	131
665·2	618·7	487·1	0·5023	1·588	132
665·3	618·7	486·9	0·5031	1·588	133
665·4	618·8	486·6	0·5039	1·587	134
665·5	618·9	486·4	0·5046	1·586	135
665·6	618·9	486·1	0·5054	1·586	136
665·7	619·0	485·9	0·5061	1·585	137
665·8	619·1	485·6	0·5068	1·584	138
665·9	619·1	485·4	0·5075	1·584	139
665·9	619·2	485·1	0·5082	1·583	140

TABLE I.

Properties of Saturated Steam on

Pressure in lbs. per square inch. p.	Temperature in degrees Centigrade. T.	Absolute temperature in degrees Centigrade. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in lb.-calories. i.	Internal heat of water in lb.-calories. e.
141	178·5	451·5	3·219	181·1	180·9
142	178·8	451·8	3·198	181·4	181·2
143	179·1	452·1	3·177	181·8	181·6
144	179·4	452·4	3·156	182·1	181·9
145	179·7	452·7	3·136	182·4	182·2
146	180·0	453·0	3·116	182·7	182·4
147	180·3	453·3	3·096	183·0	182·7
148	180·6	453·6	3·076	183·3	183·0
149	180·9	453·9	3·056	183·6	183·3
150	181·2	454·2	3·037	183·9	183·6
151	181·5	454·5	3·018	184·2	183·9
152	181·8	454·8	2·999	184·5	184·2
153	182·1	455·1	2·981	184·8	184·5
154	182·4	455·4	2·963	185·1	184·8
155	182·6	455·6	2·945	185·4	185·1
156	182·9	455·9	2·927	185·7	185·4
157	183·2	456·2	2·909	186·0	185·7
158	183·5	456·5	2·892	186·3	186·0
159	183·8	456·8	2·875	186·6	186·3
160	184·0	457·0	2·858	186·8	186·5
161	184·3	457·3	2·841	187·1	186·8
162	184·6	457·6	2·824	187·4	187·1
163	184·9	457·9	2·808	187·7	187·4
164	185·2	458·2	2·792	188·0	187·7
165	185·4	458·4	2·776	188·3	188·0
166	185·7	458·7	2·760	188·6	188·3
167	186·0	459·0	2·745	188·9	188·6
168	186·2	459·2	2·730	189·1	188·8
169	186·5	459·5	2·715	189·4	189·1
170	186·7	459·7	2·700	189·7	189·4
171	187·0	460·0	2·685	190·0	189·7
172	187·2	460·2	2·670	190·2	189·9
173	187·5	460·5	2·655	190·5	190·2
174	187·8	460·8	2·641	190·8	190·5
175	188·0	461·0	2·627	191·0	190·7

(*continued*).

PRESSURE BASE (**POUND CENTIGRADE** UNITS).

Total heat of steam in lb.-calories. I.	Internal heat of steam in lb.-calories. E.	Latent heat of steam in lb.-calories. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
666·0	619·3	484·9	0·5089	1·583	141
666·1	619·3	484·6	0·5096	1·582	142
666·2	619·4	484·4	0·5103	1·582	143
666·2	619·5	484·1	0·5110	1·581	144
666·3	619·5	483·9	0·5117	1·580	145
666·4	619·6	483·6	0·5124	1·580	146
666·4	619·6	483·4	0·5131	1·579	147
666·5	619·7	483·2	0·5138	1·579	148
666·6	619·7	483·0	0·5145	1·578	149
666·7	619·8	482·8	0·5151	1·578	150
666·7	619·8	482·5	0·5158	1·577	151
666·8	619·9	482·3	0·5164	1·577	152
666·9	619·9	482·1	0·5171	1·576	153
666·9	620·0	482·8	0·5177	1·576	154
667·0	620·0	481·6	0·5183	1·575	155
667·1	620·1	481·4	0·5190	1·575	156
667·2	620·1	481·2	0·5196	1·574	157
667·2	620·2	480·9	0·5203	1·574	158
667·3	620·2	480·7	0·5209	1·573	159
667·3	620·3	480·5	0·5215	1·573	160
667·4	620·3	480·3	0·5222	1·572	161
667·5	620·4	480·1	0·5228	1·572	162
667·5	620·4	479·8	0·5234	1·571	163
667·6	620·5	479·6	0·5240	1·571	164
667·7	620·6	479·4	0·5246	1·570	165
667·7	620·6	479·2	0·5252	1·570	166
667·8	620·7	479·0	0·5258	1·569	167
667·8	620·7	478·7	0·5264	1·569	168
667·9	620·7	478·5	0·5270	1·569	169
668·0	620·8	478·3	0·5276	1·568	170
668·0	620·8	478·1	0·5282	1·568	171
668·1	620·9	477·9	0·5288	1·568	172
668·2	620·9	477·7	0·5294	1·567	173
668·3	620·9	477·5	0·5300	1·567	174
668·3	621·0	477·3	0·5305	1·566	175

TABLE I.

PROPERTIES OF SATURATED STEAM ON

Pressure in lbs. per square inch. p.	Temperature in degrees Centigrade. T.	Absolute temperature in degrees Centigrade. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in lb.-calories. i.	Internal heat of water in lb.-calories. e.
176	188·3	461·3	2·613	191·3	191·0
177	188·5	461·5	2·599	191·5	191·2
178	188·8	461·8	2·585	191·8	191·5
179	189·0	462·0	2·571	192·0	191·7
180	189·3	462·3	2·558	192·3	192·0
181	189·5	462·5	2·545	192·5	192·2
182	189·8	462·8	2·532	192·8	192·5
183	190·1	463·1	2·519	193·1	192·8
184	190·3	463·3	2·506	193·4	193·1
185	190·6	463·6	2·493	193·7	193·4
186	190·8	463·8	2·480	193·9	193·6
187	191·1	464·1	2·467	194·2	193·9
188	191·3	464·3	2·455	194·4	194·1
189	191·6	464·6	2·443	194·7	194·4
190	191·8	464·8	2·431	195·0	194·7
191	192·0	465·0	2·419	195·2	194·9
192	192·3	465·3	2·407	195·5	195·2
193	192·5	465·5	2·395	195·7	195·4
194	192·8	465·8	2·383	196·0	195·7
195	193·0	466·0	2·372	196·2	195·9
196	193·2	466·2	2·361	196·4	196·1
197	193·5	466·5	2·349	196·7	196·4
198	193·7	466·7	2·338	197·0	196·7
199	194·0	467·0	2·327	197·3	197·0
200	194·2	467·2	2·316	197·5	197·2
201	194·4	467·4	2·305	197·7	197·4
202	194·6	467·6	2·294	197·9	197·6
203	194·9	467·9	2·283	198·2	197·9
204	195·1	468·1	2·273	198·4	198·1
205	195·3	468·3	2·263	198·7	198·4
206	195·6	468·6	2·253	199·0	198·7
207	195·8	468·8	2·243	199·2	198·9
208	196·1	469·1	2·233	199·5	199·1
209	196·3	469·3	2·223	199·7	199·3
210	196·5	469·5	2·213	199·9	199·5

(*continued*).

PRESSURE BASE (**POUND CENTIGRADE** UNITS).

Total heat of steam in lb.-calories. I.	Internal heat of steam in lb.-calories. E.	Latent heat of steam in lb.-calories. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
668·4	621·0	477·1	0·5311	1·566	176
668·4	621·1	476·9	0·5317	1·565	177
668·5	621·1	476·7	0·5323	1·565	178
668·5	621·2	476·5	0·5329	1·564	179
668·6	621·2	476·3	0·5334	1·564	180
668·6	621·3	476·1	0·5340	1·563	181
668·7	621·3	475·9	0·5345	1·563	182
668·8	621·4	475·6	0·5351	1·562	183
668·8	621·4	475·4	0·5356	1·562	184
668·9	621·4	475·2	0·5362	1·561	185
668·9	621·5	475·0	0·5367	1·561	186
669·0	621·5	474·8	0·5373	1·560	187
669·0	621·6	474·6	0·5379	1·560	188
669·1	621·6	474·4	0·5384	1·559	189
669·2	621·7	474·2	0·5390	1·559	190
669·2	621·7	474·0	0·5395	1·559	191
669·3	621·8	473·8	0·5401	1·558	192
669·3	621·8	473·6	0·5406	1·558	193
669·4	621·9	473·4	0·5412	1·558	194
669·5	621·9	473·3	0·5417	1·557	195
669·5	621·9	473·1	0·5422	1·557	196
669·6	622·0	472·9	0·5428	1·556	197
669·7	622·0	472·7	0·5433	1·556	198
669·7	622·1	472·5	0·5439	1·556	199
669·8	622·1	472·3	0·5444	1·555	200
669·8	622·1	472·1	0·5449	1·555	201
669·9	622·2	471·9	0·5455	1·555	202
669·9	622·2	471·7	0·5460	1·554	203
669·0	622·3	471·5	0·5465	1·554	204
670·0	622·3	471·3	0·5470	1·554	205
670·1	622·3	471·1	0·5476	1·553	206
670·1	622·4	471·0	0·5481	1·553	207
670·2	622·4	471·8	0·5486	1·553	208
670·2	622·5	471·6	0·5491	1·552	209
670·3	622·5	470·4	0·5496	1·552	210

TABLE I.

PROPERTIES OF SATURATED STEAM ON

Pressure in lbs. per square inch. p.	Temperature in degrees Centigrade. T.	Absolute temperature in degrees Centigrade. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in lb.-calories. i.	Internal heat of water in lb.-calories. e.
211	196·7	469·7	2·203	200·2	199·8
212	196·9	469·9	2·193	200·4	200·0
213	197·2	470·2	2·183	200·7	200·3
214	197·4	470·4	2·173	200·9	200·5
215	197·6	470·6	2·164	201·1	200·7
216	197·8	470·8	2·154	201·3	200·9
217	198·1	471·1	2·145	201·6	201·2
218	198·3	471·3	2·136	201·8	201·4
219	198·5	471·5	2·127	202·0	201·6
220	198·7	471·7	2·118	202·2	201·8
221	198·9	471·9	2·109	202·4	202·0
222	199·1	472·1	2·100	202·6	202·2
223	199·4	472·4	2·091	202·9	202·5
224	199·6	472·6	2·082	203·1	202·7
225	199·8	472·8	2·073	203·4	203·0
226	200·0	473·0	2·065	203·6	203·2
227	200·2	473·2	2·056	203·8	203·4
228	200·4	473·4	2·047	204·1	203·7
229	200·6	473·6	2·039	204·3	203·9
230	200·8	473·8	2·031	204·5	204·1
231	201·0	474·0	2·022	204·7	204·3
232	201·2	474·2	2·014	204·9	204·5
233	201·5	474·5	2·006	205·2	204·8
234	201·7	474·7	1·998	205·4	205·0
235	201·9	474·9	1·990	205·6	205·2
236	202·1	475·1	1·982	205·8	205·4
237	202·3	475·3	1·974	206·0	205·6
238	202·5	475·5	1·966	206·2	205·8
239	202·7	475·7	1·958	206·4	206·0
240	202·9	475·9	1·950	206·6	206·2
241	203·1	476·1	1·942	206·8	206·4
242	203·3	476·3	1·934	207·0	206·6
243	203·5	476·5	1·926	207·2	206·8
244	203·7	476·7	1·919	207·4	207·0
245	203·9	476·9	1·912	207·7	207·3

(*continued*).

PRESSURE BASE (**POUND CENTIGRADE** UNITS).

Total heat of steam in lb.-calories. I.	Internal heat of steam in lb.-calories. E.	Latent heat of steam in lb.-calories. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
670·3	622·5	470·2	0·5501	1·552	211
670·4	622·6	470·0	0·5506	1·551	212
670·4	622·6	469·8	0·5510	1·551	213
670·5	622·7	469·6	0·5515	1·551	214
670·5	622·7	469·5	0·5520	1·550	215
670·6	622·7	469·3	0·5525	1·550	216
670·6	622·8	469·1	0·5530	1·549	217
670·7	622·8	468·9	0·5534	1·549	218
670·7	622·9	468·8	0·5539	1·549	219
670·8	622·9	468·6	0·5544	1·548	220
670·8	622·9	468·4	0·5549	1·548	221
670·8	623·0	468·2	0·5554	1·548	222
670·9	623·0	468·0	0·5558	1·547	223
670·9	623·1	467·8	0·5563	1·547	224
671·0	623·1	467·7	0·5568	1·546	225
671·1	623·1	467·5	0·5572	1·546	226
671·1	623·2	467·3	0·5577	1·546	227
671·2	623·2	467·1	0·5582	1·545	228
671·2	623·3	466·9	0·5587	1·545	229
671·3	623·3	466·8	0·5591	1·544	230
671·3	623·3	466·6	0·5596	1·544	231
671·4	623·4	466·4	0·5600	1·544	232
671·4	623·4	466·3	0·5605	1·543	233
671·5	623·4	466·1	0·5610	1·543	234
671·5	623·5	466·0	0·5614	1·543	235
671·6	623·5	465·8	0·5619	1·542	236
671·6	623·5	465·7	0·5623	1·542	237
671·7	623·6	465·5	0·5628	1·542	238
671·7	623·6	465·4	0·5632	1·541	239
671·8	623·6	465·2	0·5637	1·541	240
671·8	623·6	465·0	0·5641	1·541	241
671·9	623·7	464·9	0·5646	1·541	242
671·9	623·7	464·7	0·5650	1·540	243
671·9	623·7	464·5	0·5655	1·540	244
672·0	623·8	464·4	0·5659	1·540	245

TABLE I.

Properties of Saturated Steam on

Pressure in lbs. per square inch. p.	Temperature in degrees Centigrade. T.	Absolute temperature in degrees Centigrade. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in lb.-calories. i.	Internal heat of water in lb.-calories. e.
246	204·1	477·1	1·905	207·9	207·5
247	204·3	477·3	1·898	208·1	207·7
248	204·5	477·5	1·891	208·3	207·9
249	204·7	477·7	1·884	208·5	208·1
250	204·9	477·9	1·877	208·7	208·3
251	205·1	478·1	1·870	208·9	208·5
252	205·3	478·3	1·863	209·1	208·7
253	205·5	478·5	1·856	209·3	208·9
254	205·7	478·7	1·849	209·5	209·1
255	205·9	478·9	1·842	209·7	209·3
256	206·0	479·0	1·835	209·9	209·5
257	206·2	479·2	1·828	210·1	209·7
258	206·4	479·4	1·822	210·3	209·9
259	206·6	479·6	1·815	210·5	210·1
260	206·8	479·8	1·809	210·7	210·3
261	207·0	480·0	1·802	210·9	210·5
262	207·2	480·2	1·796	211·1	210·7
263	207·4	480·4	1·789	211·3	210·9
264	207·6	480·6	1·783	211·5	211·1
265	207·7	480·7	1·777	211·7	211·3
266	207·9	480·9	1·770	211·9	211·5
267	208·1	481·1	1·764	212·1	211·7
268	208·3	481·3	1·758	212·3	211·9
269	208·5	481·5	1·752	212·5	212·1
270	208·7	481·7	1·746	212·7	212·3
271	208·9	481·9	1·740	212·9	212·5
272	209·1	482·1	1·734	213·1	212·7
273	209·3	482·3	1·728	213·3	212·9
274	209·4	482·4	1·722	213·5	213·1
275	209·6	482·6	1·716	213·7	213·3
276	209·8	482·8	1·710	213·9	213·5
277	210·0	483·0	1·704	214·0	213·6
278	210·1	483·1	1·698	214·2	213·8
279	210·3	483·3	1·692	214·4	214·0
280	210·5	483·5	1·687	214·6	214·2

(*continued*).

PRESSURE BASE (**POUND CENTIGRADE** UNITS).

Total heat of steam in lb.-calories. I.	Internal heat of steam in lb.-calories. E.	Latent heat of steam in lb.-calories. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
672·0	623·8	464·2	0·5663	1·539	246
672·1	623·8	464·0	0·5668	1·539	247
672·1	623·9	463·9	0·5672	1·539	248
672·2	623·9	463·7	0·5677	1·538	249
672·2	623·9	463·5	0·5681	1·538	250
672·3	623·9	463·4	0·5686	1·538	251
672·3	624·0	463·2	0·5690	1·537	252
672·3	624·0	463·0	0·5694	1·537	253
672·4	624·0	462·9	0·5698	1·537	254
672·4	624·1	462·7	0·5702	1·536	255
672·4	624·1	462·5	0·5707	1·536	256
672·5	624·1	462·4	0·5711	1·536	257
672·5	624·1	462·2	0·5715	1·535	258
672·6	624·2	462·1	0·5719	1·535	259
672·6	624·2	461·9	0·5723	1·535	260
672·6	624·2	461·7	0·5727	1·534	261
672·7	624·3	461·6	0·5731	1·534	262
672·7	624·3	461·4	0·5735	1·534	263
672·7	624·3	461·2	0·5739	1·534	264
672·8	624·3	461·1	0·5743	1·533	265
672·8	624·4	460·9	0·5747	1·533	266
672·9	624·4	460·8	0·5751	1·533	267
672·9	624·4	460·6	0·5755	1·532	268
672·9	624·5	460·5	0·5759	1·532	269
673·0	624·5	460·3	0·5763	1·532	270
673·0	624·5	460·1	0·5767	1·532	271
673·0	624·5	460·0	0·5771	1·531	272
673·1	624·6	459·8	0·5775	1·531	273
673·1	624·6	459·7	0·5779	1·531	274
673·1	624·6	459·5	0·5783	1·530	275
673·2	624·6	459·3	0·5786	1·530	276
673·2	624·7	459·1	0·5790	1·530	277
673·2	624·7	459·0	0·5794	1·530	278
673·3	624·7	458·8	0·5798	1·529	279
673·3	624·7	458·7	0·5802	1·529	280

TABLE I.

Properties of Saturated Steam on

Pressure in lbs. per square inch.	Temperature in degrees Centigrade.	Absolute temperature in degrees Centigrade.	Specific volume in cubic feet per lb.	Total heat of water in lb.-calories.	Internal heat of water in lb.-calories.
p.	T.	*θ.*	V.	*i.*	*e.*
281	210·7	483·7	1·681	214·8	214·4
282	210·9	483·9	1·676	215·0	214·6
283	211·0	484·0	1·670	215·1	214·7
284	211·2	484·2	1·665	215·3	214·9
285	211·4	484·4	1·659	215·5	215·1
286	211·5	484·5	1·654	215·7	215·3
287	211·7	484·7	1·648	215·9	215·5
288	211·9	484·9	1·643	216·1	215·7
289	212·0	485·0	1·637	216·2	215·8
290	212·2	485·2	1·632	216·4	216·0
291	212·4	485·4	1·626	216·6	216·2
292	212·6	485·6	1·621	216·8	216·4
293	212·7	485·7	1·616	217·0	216·6
294	212·9	485·9	1·611	217·2	216·8
295	213·1	486·1	1·605	217·4	217·0
296	213·2	486·2	1·600	217·6	217·1
297	213·4	486·4	1·595	217·8	217·3
298	213·6	486·6	1·590	218·0	217·5
299	213·8	486·8	1·585	218·2	217·7
300	213·9	486·9	1·580	218·3	217·8

(*continued*).

PRESSURE BASE (**POUND CENTIGRADE** UNITS).

Total heat of steam in lb.-calories. I.	Internal heat of steam in lb.-calories. E.	Latent heat of steam in lb.-calories. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
673·3	624·7	458·5	0·5806	1·529	281
673·4	624·8	458·4	0·5810	1·528	282
673·4	624·8	458·2	0·5813	1·528	283
673·4	624·8	458·1	0·5817	1·528	284
673·4	624·8	457·9	0·5821	1·527	285
673·5	624·8	457·8	0·5824	1·527	286
673·5	624·9	457·6	0·5828	1·527	287
673·5	624·9	457·5	0·5832	1·527	288
673·6	624·9	457·3	0·5836	1·526	289
673·6	624·9	457·2	0·5839	1·526	290
673·6	624·9	457·0	0·5843	1·526	291
673·7	625·0	456·9	0·5846	1·525	292
673·7	625·0	456·7	0·5850	1·525	293
673·7	625·0	456·6	0·5854	1·525	294
673·8	625·0	456·4	0·5857	1·524	295
673·8	625·0	456·2	0·5861	1·524	296
673·8	625·0	456·1	0·5864	1·524	297
673·9	625·1	455·9	0·5868	1·523	298
673·9	625·1	455·8	0·5871	1·523	299
673·9	625·1	455·6	0·5875	1·523	300

TABLE

PROPERTIES OF SATURATED STEAM

Temperature in degrees Centigrade. T.	Absolute temperature in degrees Centigrade. θ.	Pressure in lbs. per square inch. p.	Specific volume in cubic feet per lb. V.	Total heat of water in lb.-calories. i.	Internal heat of water in lb.-calories. e.
25	298	0·455	699·5	25·0	25·0
26	299	0·483	661·2	26·0	26·0
27	300	0·512	625·8	27·0	27·0
28	301	0·543	592·5	28·0	28·0
29	302	0·576	560·8	29·0	29·0
30	303	0·610	530·8	30·0	30·0
31	304	0·646	503·2	31·0	31·0
32	305	0·684	476·7	32·0	32·0
33	306	0·724	451·7	33·0	33·0
34	307	0·765	428·5	34·0	34·0
35	308	0·809	406·7	35·0	35·0
36	309	0·856	386·0	36·0	36·0
37	310	0·904	366·5	37·0	37·0
38	311	0·954	348·2	38·0	38·0
39	312	1·007	330·9	39·0	39·0
40	313	1·063	314·6	40·1	40·1
41	314	1·121	299·1	41·1	41·1
42	315	1·182	284·5	42·1	42·1
43	316	1·246	270·7	43·1	43·1
44	317	1·312	257·8	44·1	44·1
45	318	1·382	245·7	45·1	45·1
46	319	1·455	234·2	46·1	46·1
47	320	1·531	223·3	47·1	47·1
48	321	1·610	212·8	48·1	48·1
49	322	1·693	203·0	49·1	49·1
50	323	1·780	193·6	50·1	50·1
51	324	1·870	184·7	51·1	51·1
52	325	1·965	176·4	52·1	52·1
53	326	2·063	168·5	53·1	53·1
54	327	2·166	161·0	54·1	54·1
55	328	2·273	153·9	55·1	55·1
56	329	2·384	147·1	56·1	56·1
57	330	2·500	140·7	57·1	57·1
58	331	2·621	134·6	58·1	58·1
59	332	2·748	128·8	59·1	59·1
60	333	2·879	123·3	60·1	60·1

II.

ON **CENTIGRADE** TEMPERATURE BASE.

Total heat of steam in lb.-calories. I.	Internal heat of steam in lb.-calories. E.	Latent heat of steam in lb.-calories. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Temperature in degrees Centigrade. T.
606·5	573·7	581·5	0·0877	2·039	25
607·0	574·1	581·0	0·0911	2·034	26
607·4	574·4	580·4	0·0945	2·029	27
607·9	574·8	579·9	0·0978	2·024	28
608·3	575·1	579·3	0·1011	2·019	29
608·8	575·5	578·8	0·1044	2·015	30
609·2	575·8	578·2	0·1077	2·010	31
609·7	576·2	577·7	0·1110	2·005	32
610·1	576·5	577·1	0·1143	2·000	33
610·6	576·9	576·6	0·1176	1·995	34
611·1	577·2	576·1	0·1208	1·991	35
611·5	577·6	575·5	0·1241	1·986	36
612·0	577·9	575·0	0·1273	1·981	37
612·4	578·3	574·4	0·1305	1·977	38
612·9	578·6	573·9	0·1337	1·972	39
613·4	579·0	573·3	0·1369	1·968	40
613·8	579·4	572·8	0·1401	1·963	41
614·3	579·7	572·2	0·1433	1·959	42
614·8	580·1	571·7	0·1465	1·955	43
615·2	580·4	571·1	0·1497	1·951	44
615·7	580·8	570·6	0·1528	1·947	45
616·2	581·2	570·1	0·1560	1·943	46
616·6	581·5	569·5	0·1591	1·939	47
617·1	581·9	569·0	0·1623	1·935	48
617·5	582·2	568·4	0·1654	1·931	49
618·0	582·6	567·9	0·1685	1·927	50
618·4	582·9	567·3	0·1716	1·923	51
618·9	583·3	566·8	0·1747	1·919	52
619·4	583·6	566·3	0·1778	1·915	53
619·8	584·0	565·7	0·1809	1·911	54
620·3	584·3	565·2	0·1839	1·907	55
620·7	584·6	564·6	0·1870	1·903	56
621·2	585·0	564·1	0·1900	1·899	57
621·6	585·3	563·5	0·1931	1·895	58
622·1	585·7	563·0	0·1961	1·891	59
622·5	586·0	562·4	0·1991	1·888	60

TABLE II.

Properties of Saturated Steam

Temperature in degrees Centigrade. T.	Absolute temperature in degrees Centigrade. θ.	Pressure in lbs. per square inch. p.	Specific volume in cubic feet per lb. V.	Total heat of water in lb.-calories. i.	Internal heat of water in lb.-calories. e.
61	334	3·015	118·0	61·1	61·1
62	335	3·157	113·0	62·2	62·2
63	336	3·303	108·2	63·2	63·2
64	337	3·457	103·7	64·2	64·2
65	338	3·616	99·48	65·2	65·2
66	339	3·782	95·45	66·2	66·2
67	340	3·953	91·57	67·2	67·2
68	341	4·131	87·85	68·2	68·2
69	342	4·316	84·30	69·2	69·2
70	343	4·508	80·90	70·2	70·2
71	344	4·707	77·65	71·2	71·2
72	345	4·912	74·58	72·2	72·2
73	346	5·127	71·63	73·2	73·2
74	347	5·348	68·86	74·3	74·3
75	348	5·579	66·23	75·3	75·3
76	349	5·816	63·71	76·3	76·3
77	350	6·062	61·29	77·3	77·3
78	351	6·317	58·96	78·3	78·3
79	352	6·582	56·73	79·3	79·3
80	353	6·857	54·60	80·3	80·3
81	354	7·140	52·58	81·3	81·3
82	355	7·433	50·64	82·3	82·3
83	356	7·735	48·78	83·3	83·3
84	357	8·048	47·00	84·3	84·3
85	358	8·373	45·29	85·3	85·3
86	359	8·708	43·67	86·3	86·3
87	360	9·053	42·12	87·3	87·3
88	361	9·411	40·62	88·4	88·3
89	362	9·779	39·17	89·4	89·4
90	364	10·16	37·79	90·4	90·4
91	364	10·56	36·45	91·4	91·4
92	365	10·97	35·18	92·4	92·4
93	366	11·39	33·98	93·4	93·4
94	367	11·82	32·83	94·4	94·4
95	368	12·26	31·71	95·4	95·4

(*continued*).

ON **CENTIGRADE** TEMPERATURE BASE.

Total heat of steam in lb.-calories. I.	Internal heat of steam in lb.-calories. E.	Latent heat of steam in lb.-calories. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Temperature in degrees Centigrade. T.
623·0	586·4	561·9	0·2021	1·884	61
623·5	586·7	561·3	0·2051	1·880	62
623·9	587·1	560·7	0·2081	1·877	63
624·4	587·4	560·2	0·2111	1·873	64
624·8	587·8	559·6	0·2141	1·870	65
625·2	588·1	559·0	0·2171	1·866	66
625·7	588·5	558·5	0·2200	1·863	67
626·1	588·8	557·9	0·2230	1·859	68
626·5	589·2	557·3	0·2260	1·856	69
626·9	589·5	556·7	0·2289	1·852	70
627·4	589·8	556·2	0·2318	1·849	71
627·8	590·1	555·6	0·2347	1·845	72
628·2	590·5	555·0	0·2376	1·842	73
628·7	590·8	554·4	0·2405	1·838	74
629·1	591·1	553·8	0·2434	1·835	75
629·5	591·5	553·2	0·2463	1·831	76
630·0	591·8	552·7	0·2492	1·828	77
630·4	592·1	552·1	0·2521	1·825	78
530·9	592·4	551·6	0·2550	1·822	79
631·3	592·8	551·0	0·2578	1·819	80
631·7	593·2	550·4	0·2607	1·815	81
632·2	593·5	549·9	0·2635	1·812	82
632·6	593·8	549·3	0·2664	1·809	83
633·0	594·2	548·7	0·2692	1·806	84
633·4	594·5	548·1	0·2720	1·803	85
633·8	594·8	547·5	0·2748	1·800	86
634·3	595·1	547·0	0·2776	1·797	87
634·8	595·5	546·4	0·2804	1·794	88
635·2	595·8	545·8	0·2832	1·791	89
635·6	596·1	545·2	0·2860	1·788	90
636·0	596·4	544·6	0·2888	1·785	91
636·4	596·7	544·0	0·2916	1·782	92
636·8	597·0	543·4	0·2944	1·779	93
637·2	597·3	542·8	0·2972	1·776	94
637·6	597·6	542·2	0·2999	1·773	95

TABLE II.

Properties of Saturated Steam

Temperature in degrees Centigrade. T.	Absolute temperature in degrees Centigrade. θ.	Pressure in lbs. per square inch. p.	Specific volume in cubic feet per lb. V.	Total heat of water in lb.-calories. i.	Internal heat of water in lb.-calories. e.
96	369	12·72	30·63	96·4	96·4
97	370	13·19	29·60	97·5	97·5
98	371	13·68	28·61	98·5	98·5
99	372	14·18	27·66	99·5	99·5
100	373	14·70	26·75	100·5	100·5
101	374	15·23	25·87	101·5	101·5
102	375	15·78	25·03	102·5	102·5
103	376	16·35	24·22	103·5	103·5
104	377	16·93	23·44	104·5	104·5
105	378	17·53	22·69	105·6	105·6
106	379	18·15	21·98	106·6	106·6
107	380	18·78	21·28	107·6	107·6
108	381	19·43	20·61	108·6	108·6
109	382	20·11	19·96	109·6	109·6
110	383	20·80	19·34	110·7	110·6
111	384	21·51	18·74	111·7	111·7
112	385	22·24	18·17	112·7	112·7
113	386	22·99	17·61	113·7	113·7
114	387	23·76	17·07	114·7	114·7
115	388	24·55	16·56	115·8	115·7
116	389	25·36	16·06	116·8	116·7
117	390	26·20	15·58	117·8	117·8
118	391	27·06	15·13	118·8	118·8
119	392	27·94	14·69	119·8	119·8
120	393	28·84	14·25	120·8	120·8
121	394	29·77	13·83	121·9	121·8
122	395	30·72	13·43	122·9	122·8
123	396	31·70	13·04	123·9	123·9
124	397	32·70	12·66	124·9	124·9
125	398	33·73	12·30	125·9	125·9
126	399	34·79	11·95	127·0	126·9
127	400	35·86	11·61	128·0	127·9
128	401	36·97	11·29	129·0	129·0
129	402	38·11	10·97	130·0	130·0
130	403	39·27	10·67	131·1	131·0

(*continued*).

ON **CENTIGRADE** TEMPERATURE BASE.

Total heat of steam in lb.-calories. I.	Internal heat of steam in lb.-calories. E.	Latent heat of steam in lb.-calories. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Temperature in degrees Centigrade. T.
638·0	597·9	541·6	0·3026	1·770	96
638·4	598·2	541·0	0·3054	1·767	97
638·8	598·5	540·4	0·3081	1·764	98
639·2	598·8	539·8	0·3109	1·761	99
639·6	599·1	539·1	0·3136	1·759	100
640·0	599·4	538·5	0·3163	1·756	101
640·4	599·7	537·9	0·3190	1·753	102
640·8	600·0	537·3	0·3217	1·750	103
641·2	600·4	536·7	0·3244	1·747	104
641·6	600·7	536·0	0·3270	1·745	105
642·0	601·0	535·4	0·3297	1·742	106
642·4	601·3	534·8	0·3324	1·740	107
642·8	601·6	534·2	0·3351	1·737	108
643·2	601·9	533·6	0·3378	1·735	109
643·6	602·2	532·9	0·3404	1·732	110
644·0	602·5	532·3	0·3431	1·729	111
644·4	602·8	531·7	0·3457	1·727	112
644·7	603·1	531·0	0·3484	1·724	113
645·1	603·4	530·4	0·3510	1·722	114
645·5	603·7	529·7	0·3536	1·719	115
645·9	604·0	529·1	0·3562	1·716	116
646·2	604·3	528·4	0·3588	1·714	117
646·6	604·6	527·8	0·3614	1·711	118
647·0	604·9	527·2	0·3640	1·709	119
647·4	605·1	526·5	0·3665	1·706	120
647·8	605·4	525·9	0·3691	1·704	121
648·1	605·7	525·2	0·3717	1·701	122
648·5	606·0	524·6	0·3743	1·699	123
648·8	606·3	524·0	0·3769	1·696	124
649·2	606·6	523·3	0·3794	1·694	125
649·6	606·9	522·7	0·3820	1·692	126
650·0	607·2	522·0	0·3846	1·689	127
650·4	607·5	521·4	0·3871	1·687	128
650·7	607·7	520·7	0·3897	1·685	129
651·1	608·0	520·0	0·3922	1·683	130

TABLE II.

Properties of Saturated Steam

Temperature in degrees Centigrade. T.	Absolute temperature in degrees Centigrade. θ.	Pressure in lbs. per square inch. p.	Specific volume in cubic feet per lb. V.	Total heat of water in lb.-calories. i.	Internal heat of water in lb.-calories. e.
131	404	40·47	10·37	132·1	132·0
132	405	41·68	10·09	133·1	133·0
133	406	42·93	9·815	134·1	134·1
134	407	44·21	9·557	135·2	135·1
135	408	45·52	9·290	136·2	136·1
136	409	46·87	9·042	137·2	137·1
137	410	48·25	8·802	138·2	138·1
138	411	49·65	8·569	139·3	139·2
139	412	51·09	8·343	140·3	140·2
140	413	52·55	8·123	141·3	141·2
141	414	54·06	7·910	142·3	142·2
142	415	55·61	7·704	143·4	143·3
143	416	57·18	7·505	144·4	144·3
144	417	58·79	7·312	145·4	145·3
145	418	60·44	7·126	146·4	146·3
146	419	62·13	6·945	147·5	147·4
147	420	63·85	6·769	148·5	148·4
148	421	65·61	6·599	149·5	149·4
149	422	67·41	6·434	150·5	150·4
150	423	69·24	6·274	151·6	151·5
151	424	71·12	6·118	152·6	152·5
152	425	73·04	5·967	153·6	153·5
153	426	75·00	5·820	154·6	154·5
154	427	77·00	5·677	155·7	155·6
155	428	79·05	5·541	156·7	156·6
156	429	81·14	5·410	157·7	157·6
157	430	83·27	5·281	158·8	158·7
158	431	85·44	5·155	159·8	159·7
159	432	87·66	5·032	160·8	160·7
160	433	89·93	4·911	161·9	161·7
161	434	92·24	4·792	162·9	162·8
162	435	94·61	4·678	163·9	163·8
163	436	97·02	4·570	165·0	164·8
164	437	99·47	4·466	166·0	165·9
165	438	102·0	4·364	167·0	166·9

(continued).

ON **CENTIGRADE** TEMPERATURE BASE.

Total heat of steam in lb.-calories. I.	Internal heat of steam in lb.-calories. E.	Latent heat of steam in lb.-calories. L.	Entropy of water in ranks. ϕ_w.	Entropy o f steam in ranks. ϕ_s.	Temperature in degrees Centigrade. T.
651·5	608·3	519·4	0·3947	1·680	131
651·8	608·5	518·7	0·3972	1·678	132
652·1	608·8	518·0	0·3997	1·676	133
652·5	609·1	517·3	0·4022	1·673	134
652·8	609·3	516·6	0·4047	1·671	135
653·2	609·6	516·0	0·4072	1·669	136
653·5	609·8	515·3	0·4097	1·667	137
653·9	610·1	514·6	0·4122	1·664	138
654·2	610·3	513·9	0·4147	1·662	139
654·5	610·6	513·2	0·4172	1·660	140
654·8	610·8	512·5	0·4197	1·658	141
655·2	611·1	511·8	0·4221	1·656	142
655·5	611·3	511·1	0·4246	1·653	143
655·8	611·6	510·4	0·4270	1·651	144
656·1	611·8	509·7	0·4295	1·649	145
656·5	612·0	509·0	0·4319	1·647	146
656·8	612·3	508·3	0·4344	1·644	147
657·1	612·5	507·6	0·4368	1·642	148
657·4	612·8	506·9	0·4393	1·640	149
657·7	613·0	506·1	0·4417	1·638	150
658·0	613·2	505·4	0·4442	1·636	151
658·3	613·5	504·7	0·4466	1·634	152
658·6	613·7	504·0	0·4490	1·632	153
658·9	614·0	503·3	0·4514	1·630	154
659·2	614·2	502·5	0·4538	1·628	155
659·5	614·4	501·8	0·4562	1·626	156
659·9	614·7	501·1	0·4586	1·624	157
660·2	614·9	500·4	0·4610	1·622	158
660·5	615·1	499·7	0·4634	1·620	159
660·8	615·3	498·9	0·4657	1·618	160
661·1	615·6	498·2	0·4681	1·616	161
661·4	615·8	497·5	0·4705	1·614	162
661·7	616·0	496·7	0·4729	1·612	163
662·0	616·2	496·0	0·4753	1·610	164
662·3	616·5	495·2	0·4776	1·608	165

TABLE II.

Properties of Saturated Steam

Temperature in degrees Centigrade. T.	Absolute temperature in degrees Centigrade. θ.	Pressure in lbs. per square inch. p.	Specific volume in cubic feet per lb. V.	Total heat of water in lb.-calories. i.	Internal heat of water in lb.-calories. e.
166	439	104·5	4·266	168·1	167·9
167	440	107·1	4·169	169·1	169·0
168	441	109·7	4·073	170·2	170·0
169	442	112·4	3·981	171·2	171·0
170	443	115·2	3·891	172·2	172·0
171	444	118·0	3·802	173·3	173·1
172	445	120·9	3·718	174·3	174·1
173	446	123·8	3·635	175·3	175·1
174	447	126·8	3·555	176·4	176·2
175	448	129·9	3·477	177·4	177·2
176	449	133·0	3·401	178·5	178·3
177	450	136·1	3·328	179·5	179·3
178	451	139·3	3·257	180·5	180·3
179	452	142·6	3·187	181·6	181·4
180	453	145·9	3·118	182·6	182·4
181	454	149·3	3·051	183·7	183·4
182	455	152·7	2·985	184·7	184·5
183	456	156·2	2·923	185·8	185·5
184	457	159·8	2·862	186·8	186·5
185	458	163·4	2·802	187·9	187·6
186	459	167·1	2·742	188·9	188·6
187	460	170·9	2·685	189·9	189·7
188	461	174·7	2·630	191·0	190·7
189	462	178·6	2·577	192·0	191·7
190	463	182·6	2·524	193·1	192·8
191	464	186·6	2·473	194·1	193·8
192	465	190·7	2·423	195·2	194·9
193	466	194·9	2·374	196·2	195·9
194	467	199·1	2·326	197·3	197·0
195	468	203·4	2·279	198·3	198·0
196	469	207·8	2·234	199·4	199·0
197	470	212·2	2·190	200·4	200·1
198	471	216·7	2·148	201·5	201·1
199	472	221·3	2·105	202·5	202·2
200	473	226·0	2·064	203·6	203·2

(*continued*).

ON **CENTIGRADE** TEMPERATURE BASE.

Total heat of steam in lb.-calories. I.	Internal heat of steam in lb.-calories. E.	Latent heat of steam in lb.-calories. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Temperature in degrees Centigrade. T.
662·6	616·7	494·5	0·4800	1·606	166
662·9	616·9	493·7	0·4823	1·604	167
663·2	617·2	493·0	0·4846	1·602	168
663·5	617·4	492·3	0·4869	1·600	169
663·7	617·6	491·5	0·4892	1·599	170
664·0	617·8	490·8	0·4916	1·597	171
664·3	618·0	490·0	0·4939	1·595	172
664·6	618·2	489·3	0·4963	1·593	173
664·9	618·4	488·5	0·4986	1·591	174
665·1	618·6	487·7	0·5009	1·589	175
665·4	618·8	487·0	0·5032	1·587	176
665·7	619·0	486·2	0·5055	1·585	177
665·9	619·2	485·4	0·5078	1·583	178
666·2	619·4	484·6	0·5100	1·581	179
666·4	619·6	483·8	0·5123	1·580	180
666·7	619·8	483·0	0·5146	1·578	181
666·9	620·0	482·2	0·5169	1·576	182
667·2	620·2	481·4	0·5192	1·574	183
667·4	620·4	480·6	0·5215	1·572	184
667·7	620·6	479·8	0·5238	1·571	185
667·9	620·8	479·0	0·5260	1·569	186
668·1	621·0	478·2	0·5283	1·568	187
668·4	621·2	477·4	0·5306	1·566	188
668·6	621·4	476·6	0·5328	1·565	189
668·9	621·5	475·8	0·5350	1·563	190
669·1	621·7	475·0	0·5373	1·561	191
669·3	621·9	474·1	0·5395	1·559	192
669·5	622·0	473·3	0·5417	1·558	193
669·8	622·2	472·5	0·5440	1·556	194
670·0	622·3	471·6	0·5462	1·554	195
670·2	622·5	470·8	0·5484	1·552	196
670·4	622·6	469·9	0·5507	1·551	197
670·6	622·7	469·1	0·5529	1·549	198
670·8	622·9	468·2	0·5551	1·548	199
671·0	623·0	467·4	0·5573	1·546	200

TABLE II.

Properties of Saturated Steam

Temperature in degrees Centigrade. T.	Absolute temperature in degrees Centigrade. θ.	Pressure in lbs. per square inch. p.	Specific volume in cubic feet per lb. V.	Total heat of water in lb.-calories. i.	Internal heat of water in lb.-calories. e.
201	474	230·8	2·024	204·6	204·3
202	475	235·6	1·986	205·7	205·3
203	476	240·5	1·948	206·7	206·3
204	477	245·5	1·910	207·7	207·4
205	478	250·6	1·873	208·8	208·4
206	479	255·7	1·836	209·9	209·5
207	480	261·0	1·801	210·9	210·5
208	481	266·3	1·767	212·0	211·6
209	482	271·7	1·734	213·0	212·6
210	483	277·2	1·703	214·1	213·7

(*continued*).

ON **CENTIGRADE** TEMPERATURE BASE.

Total heat of steam in lb.-calories. I.	Internal heat of steam in lb.-calories. E.	Latent heat of steam in lb.-calories. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s	Temperature in degrees Centigrade. T.
671·2	623·2	466·6	0·5595	1·544	201
671·4	623·3	465·8	0·5617	1·543	202
671·6	623·5	464·9	0·5639	1·541	203
671·8	623·6	464·1	0·5661	1·540	204
672·1	623·8	463·3	0·5683	1·538	205
672·3	624·0	462·5	0·5705	1·536	206
672·6	624·1	461·6	0·5727	1·535	207
672·8	624·3	460·8	0·5749	1·533	208
673·0	624·4	460·0	0·5771	1·532	209
673·2	624·6	459·1	0·5792	1·530	210

NOTE ON TABLE III.

The following values represent the specific heat of superheated steam at the tabulated temperatures (Centigrade) at various pressures.

TABLE III.

Specific Heats of Superheated Steam at Various Temperatures (**CENTIGRADE**) and Pressures.

Temperature T° C.	Pressures in lbs. per square inch.							
	20.	40.	60.	80.	100.	120.	140.	160.
108·8	0·508							
110	0·507							
115	0·506							
120	0·504							
125	0·502							
130	0·501							
130·6		0·525						
135	0·500	0·523						
140	0·499	0·521						
144·7			0·539					
145	0·498	0·518	0·539					
150	0·497	0·516	0·536					
155	0·496	0·514	0·533					
155·4				0·551				
160	0·495	0·513	0·530	0·548				
164·1					0·562			
165	0·494	0·511	0·528	0·545	0·561			
170	0·493	0·509	0·525	0·541	0·557			
171·6						0·572		
175	0·492	0·508	0·523	0·538	0·554	0·569		
178·2							0·581	
180	0·492	0·506	0·521	0·536	0·550	0·564	0·579	
184·0								0·589

TABLE III.

Specific Heats of Superheated Steam at Various

Temperature T°C.	Pressures in lbs. per square inch.							
	20.	40.	60.	80.	100.	120.	140.	160.
185	0·491	0·505	0·519	0·533	0·547	0·560	0·574	0·588
189·3								
190	0·490	0·504	0·517	0·530	0·543	0·556	0·570	0·583
194·2								
195	0·490	0·502	0·515	0·528	0·540	0·553	0·566	0·578
198·7								
200	0·489	0·501	0·513	0·525	0·537	0·549	0·562	0·574
202·9								
205	0·489	0·500	0·512	0·523	0·535	0·546	0·558	0·569
206·8								
210	0·488	0·499	0·510	0·521	0·532	0·543	0·554	0·565
210·5								
213·9								
220	0·487	0·497	0·507	0·517	0·528	0·538	0·548	0·558
230	0·486	0·496	0·505	0·514	0·523	0·533	0·542	0·551
240	0·485	0·494	0·502	0·511	0·519	0·528	0·536	0·545
250	0·485	0·493	0·500	0·508	0·516	0·524	0·531	0·539
260	0·484	0·491	0·499	0·506	0·513	0·520	0·527	0·534
270	0·484	0·490	0·497	0·504	0·510	0·517	0·523	0·530
280	0·483	0·489	0·495	0·502	0·508	0·514	0·520	0·526
290	0·483	0·488	0·494	0·500	0·505	0·511	0·517	0·522
300	0·482	0·487	0·493	0·498	0·503	0·508	0·514	0·519
310	0·482	0·487	0·492	0·496	0·501	0·506	0·511	0·516
320	0·482	0·486	0·491	0·495	0·500	0·504	0·509	0·513
330	0·481	0·485	0·490	0·494	0·498	0·502	0·506	0·511

(*continued*).

TEMPERATURES (**CENTIGRADE**) AND PRESSURES (*continued*).

Pressures in lbs. per square inch.							Temperature T° C.
180.	200.	220.	240.	260.	280.	300.	
							185
0·597							189·3
0·596							190
	0·605						194·2
0·591	0·604						195
		0·611					198·7
0·586	0·598	0·610					200
			0·618				202·9
0·581	0·592	0·604	0·615				205
				0·624			206·9
0·576	0·587	0·598	0·609	0·620			210
					0·631		210·5
						0·637	213·9
0·568	0·578	0·588	0·598	0·608	0·618	0·629	220
0·560	0·570	0·579	0·588	0·597	0·607	0·616	230
0·553	0·562	0·571	0·579	0·587	0·596	0·604	240
0·547	0·555	0·563	0·571	0·578	0·586	0·594	250
0·542	0·549	0·556	0·564	0·570	0·578	0·585	260
0·537	0·544	0·550	0·557	0·563	0·570	0·577	270
0·532	0·539	0·545	0·551	0·557	0·563	0·569	280
0·528	0·534	0·540	0·545	0·551	0·556	0·562	290
0·524	0·530	0·535	0·540	0·545	0·550	0·556	300
0·521	0·526	0·531	0·536	0·540	0·545	0·550	310
0·518	0·522	0·527	0·531	0·536	0·540	0·545	320
0·515	0·519	0·523	0·527	0·532	0·536	0·540	330

TABLE III.

Specific Heats of Superheated Steam at Various

Temperature T° C.	Pressures in lbs. per square inch.							
	20.	40.	60.	80.	100.	120.	140.	160.
340	0·481	0·485	0·489	0·493	0·497	0·500	0·504	0·508
350	0·481	0·484	0·488	0·492	0·495	0·499	0·503	0·506
360	0·480	0·484	0·487	0·491	0·494	0·497	0·501	0·504
370	0·480	0·483	0·487	0·490	0·493	0·496	0·499	0·502
380	0·480	0·483	0·486	0·489	0·492	0·495	0·498	0·501
390	0·480	0·483	0·485	0·488	0·491	0·494	0·497	0·499
400	0·480	0·482	0·485	0·487	0·490	0·493	0·495	0·498
410	0·479	0·482	0·484	0·487	0·489	0·492	0·494	0·497
420	0·479	0·482	0·484	0·486	0·489	0·491	0·493	0·496
430	0·479	0·481	0·484	0·486	0·488	0·490	0·492	0·495
440	0·479	0·481	0·483	0·485	0·487	0·489	0·491	0·494
450	0·479	0·481	0·483	0·485	0·487	0·489	0·491	0·493
460	0·479	0·481	0·483	0·484	0·486	0·488	0·490	0·492
470	0·479	0·480	0·482	0·484	0·486	0·487	0·489	0·491
480	0·479	0·480	0·482	0·483	0·485	0·487	0·488	0·490
490	0·479	0·480	0·482	0·483	0·485	0·486	0·488	0·489
500	0·478	0·480	0·481	0·483	0·484	0·486	0·487	0·488
510	0·478	0·480	0·481	0·482	0·484	0·485	0·487	0·488
520	0·478	0·480	0·481	0·482	0·483	0·485	0·486	0·487
530	0·478	0·479	0·481	0·482	0·483	0·484	0·486	0·487
540	0·478	0·479	0·480	0·482	0·483	0·484	0·485	0·486
550	0·478	0·479	0·480	0·481	0·483	0·484	0·485	0·486

(*continued*).

TEMPERATURES (**CENTIGRADE**) AND PRESSURES (*continued*).

Pressures in lbs. per square inch.							Temperature T° C.
180.	200.	220.	240.	260.	280.	300.	
0·512	0·516	0·520	0·524	0·528	0·532	0·536	340
0·510	0·514	0·517	0·521	0·525	0·528	0·532	350
0·508	0·511	0·515	0·518	0·521	0·524	0·528	360
0·506	0·509	0·512	0·515	0·518	0·521	0·525	370
0·504	0·507	0·510	0·513	0·516	0·519	0·522	380
0·502	0·505	0·508	0·511	0·514	0·516	0·519	390
0·501	0·503	0·506	0·509	0·511	0·514	0·516	400
0·499	0·501	0·504	0·507	0·509	0·511	0·514	410
0·498	0·500	0·502	0·505	0·507	0·509	0·512	420
0·497	0·499	0·501	0·503	0·505	0·508	0·510	430
0·496	0·498	0·500	0·502	0·504	0·506	0·508	440
0·495	0·497	0·498	0·500	0·502	0·504	0·506	450
0·494	0·496	0·497	0·499	0·501	0·503	0·505	460
0·493	0·494	0·496	0·498	0·499	0·501	0·503	470
0·491	0·493	0·495	0·496	0·498	0·499	0·501	480
0·491	0·492	0·494	0·495	0·497	0·498	0·500	490
0·490	0·491	0·493	0·494	0·496	0·497	0·498	500
0·489	0·491	0·492	0·493	0·495	0·496	0·497	510
0·489	0·490	0·491	0·492	0·494	0·495	0·496	520
0·488	0·489	0·490	0·492	0·493	0·494	0·495	530
0·487	0·489	0·490	0·491	0·492	0·493	0·494	540
0·487	0·488	0·490	0·491	0·492	0·493	0·494	550

NOTE ON TABLE IV.

The following values represent the average specific heat of superheated steam from saturation to the tabulated temperatures (centigrade) at various pressures. The values are those most commonly required. The average specific heat over any other range is best obtained from Table III.

TABLE IV.

AVERAGE SPECIFIC HEATS OF SUPERHEATED STEAM FROM SATURATION TO TABULATED TEMPERATURES (**CENTIGRADE**) AT VARIOUS PRESSURES.

Temperature T° C.	Pressures in lbs. per square inch.							
	20.	40.	60.	80.	100.	120.	140.	160.
108·8	0·508							
110	0·507							
120	0·506							
130	0·505							
130·6		0·525						
140	0·503	0·523						
144·7			0·539					
150	0·502	0·521	0·538					
155·4				0·551				
160	0·501	0·519	0·535	0·549				
164·1					0·562			
170	0·500	0·517	0·532	0·546	0·559			
171·6						0·572		
178·2							0·581	
180	0·499	0·515	0·530	0·543	0·556	0·568	0·580	
184·0								0·589

TABLE IV.

Average Specific Heats of Superheated Steam from Various

Temperature T° C.	Pressures in lbs. per square inch.							
	20.	40.	60.	80.	100.	120	140.	160.
189·3								
190	0·498	0·513	0·527	0·540	0·553	0·564	0·575	0·586
194·2								
198·7								
200	0·497	0·512	0·525	0·538	0·550	0·561	0·571	0·581
202·9								
206·8								
210·5								
213·9								
220	0·495	0·509	0·521	0·533	0·544	0·554	0·563	0·573
240	0·493	0·506	0·518	0·528	0·538	0·547	0·556	0·565
260	0·492	0·504	0·515	0·524	0·533	0·542	0·550	0·558
280	0·491	0·502	0·512	0·521	0·529	0·537	0·545	0·552
300	0·491	0·501	0·510	0·518	0·526	0·533	0·541	0·548
320	0·490	0·500	0·508	0·515	0·523	0·530	0·537	0·543
340	0·489	0·498	0·506	0·513	0·520	0·526	0·533	0·539
360	0·489	0·497	0·504	0·511	0·517	0·523	0·530	0·535
380	0·488	0·496	0·503	0·509	0·515	0·521	0·527	0·532
400	0·487	0·495	0·501	0·507	0·513	0·518	0·524	0·529
425	0·486	0·493	0·499	0·505	0·510	0·515	0·521	0·526
450	0·486	0·492	0·498	0 503	0·508	0·513	0·518	0·523
475	0·486	0·491	0·497	0·501	0·506	0·511	0·516	0·520
500	0·485	0·491	0·496	0·500	0·505	0·509	0·514	0·518
525	0·485	0·490	0·495	0·499	0·503	0·507	0·512	0·515
550	0·485	0·490	0·494	0·498	0·502	0·506	0·510	0·513

(*continued*).

SATURATION TO TABULATED TEMPERATURES (**CENTIGRADE**) AT PRESSURES (*continued*).

Pressures in lbs. per square inch.							Temperature T° C.
180.	200.	220.	240.	260.	280.	300.	
0·597							189·3
0·596							190
	0·605						194·2
		0·611					198·7
0·591	0·601	0·610					200
			0·618				202·9
				0·624			206·8
					0·631		210·5
						0·637	213·9
0·582	0·591	0·600	0·608	0·616	0·625	0·633	220
0·573	0·582	0·590	0·597	0·605	0·613	0·620	240
0·566	0·574	0·581	0·588	0·595	0·602	0·609	260
0·560	0·567	0·574	0·581	0·587	0·593	0·599	280
0·554	0·561	0·567	0·573	0·579	0·585	0·591	300
0·549	0·555	0·561	0·567	0·572	0·578	0·583	320
0·544	0·550	0·556	0·561	0·566	0·571	0·576	340
0·540	0·546	0·551	0·556	0·561	0·566	0·570	360
0·537	0·542	0·546	0·551	0·556	0·561	0·565	380
0·533	0·538	0·542	0·547	0·551	0·556	0·560	400
0·530	0·534	0·538	0·542	0·546	0·551	0·555	425
0·527	0·531	0·534	0·538	0·542	0·546	0·550	450
0·524	0·528	0·531	0·535	0·538	0·542	0·546	475
0·522	0·525	0·528	0·532	0·535	0·538	0·542	500
0·519	0·522	0·525	0·529	0·532	0·535	0·538	525
0·517	0·520	0·523	0·526	0·529	0·532	0·535	550

TABLE

PROPERTIES OF SATURATED STEAM ON

Pressure in lbs. per square inch. p.	Temperature in degrees Fahrenheit. T.	Absolute temperature in degrees Fahrenheit. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in B. Th. U. i.	Internal heat of water in B. Th. U. e.
0·1	34·9 (2)	494·3	2937	2·9	2·9
0·2	53·2	512·6	1523	21·2	21·2
0·3	64·6	524·0	1037	32·6	32·6
0·4	73·0	532·4	790·5	41·0	41·0
0·5	79·9	539·3	640·3	47·9	47·9
0·6	85·5	544·9	539·1	53·6	53·6
0·7	90·3	549·7	436·1	58·4	58·4
0·8	94·6	554·0	410·9	62·7	62·7
0·9	98·5	557·9	367·0	66·6	66·6
1·0	102·0	561·4	333·0	70·1	70·1
1·1	105·1	564·5	304·3	73·2	73·2
1·2	108·1	567·5	280·4	76·2	76·2
1·3	111·0	570·4	260·1	79·1	79·1
1·4	113·5	572·9	242·6	81·6	81·6
1·5	115·9	575·3	227·3	84·0	84·0
1·6	118·2	577·6	213·9	86·3	86·3
1·7	120·4	579·8	202·1	88·5	88·5
1·8	122·5	581·9	191·5	90·7	90·7
1·9	124·5	583·9	182·0	92·7	92·7
2·0	126·3	585·7	173·4	94·5	94·5
2·1	128·1	587·5	165·6	96·3	96·3
2·2	129·8	589·2	158·6	98·0	98·0
2·3	131·5	590·9	152·1	99·7	99·7
2·4	133·1	592·5	146·1	101·3	101·3
2·5	134·6	594·0	140·6	102·8	102·8
2·6	136·1	595·5	135·5	104·2	104·2
2·7	137·5	596·9	130·8	105·7	105·7
2·8	138·9	598·3	126·4	107·1	107·1
2·9	140·3	599·7	122·3	108·5	108·5
3·0	141·6	601·0	118·5	109·9	109·9
3·2	144·1	603·5	111·5	112·4	112·4
3·4	146·5	605·9	105·4	114·8	114·8
3·6	148·7	608·1	99·85	117·0	117·0
3·8	150·8	610·2	94·91	119·1	119·1
4·0	152·9	612·3	90·47	121·2	121·2

V.

PRESSURE BASE (**POUND-FAHRENHEIT** UNITS).

Total heat of steam in B. Th. U. I.	Internal heat of steam in B. Th. U. E.	Latent heat of steam in B. Th. U. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
1071·6	1017·3	1068·7	0·006	2·168	0·1
1080·3	1023·9	1059·1	0·042	2·108	0·2
1086·0	1028·2	1053·4	0·064	2·074	0·3
1089·7	1031·2	1048·7	0·080	2·050	0·4
1092·8	1033·5	1044·9	0·093	2·030	0·5
1095·4	1035·6	1041·8	0·103	2·015	0·6
1097·7	1037·4	1039·3	0·112	2·003	0·7
1099·8	1038·9	1037·1	0·120	1·992	0·8
1101·5	1040·3	1034·9	0·127	1·982	0·9
1103·0	1041·6	1032·9	0·133	1·973	1·0
1104·5	1042·8	1031·3	0·139	1·965	1·1
1105·9	1043·8	1029·7	0·144	1·958	1·2
1107·2	1044·7	1028·1	0·149	1·951	1·3
1108·3	1045·5	1026·6	0·154	1·945	1·4
1109·4	1046·3	1025·4	0·158	1·940	1·5
1110·5	1045·1	1024·2	0·162	1·935	1·6
1111·5	1045·9	1023·0	0·166	1·930	1·7
1112·4	1046·7	1021·7	0·169	1·926	1·8
1113·3	1047·4	1020·6	0·173	1·922	1·9
1114·2	1050·1	1019·7	0·176	1·918	2·0
1115·1	1050·8	1018·8	0·179	1·914	2·1
1116·0	1051·4	1018·0	0·182	1·910	2·2
1116·9	1052·1	1017·2	0·185	1·906	2·3
1117·7	1052·7	1016·4	0·187	1·902	2·4
1118·4	1053·2	1015·6	0·190	1·899	2·5
1119·0	1053·7	1014·7	0·192	1·896	2·6
1119·6	1054·1	1013·9	0·195	1·893	2·7
1120·1	1054·5	1013·0	0·197	1·890	2·8
1120·7	1054·9	1012·2	0·200	1·888	2·9
1121·2	1055·3	1011·4	0·202	1·885	3·0
1122·5	1056·2	1010·1	0·206	1·880	3·2
1123·7	1057·0	1008·9	0·210	1·875	3·4
1124·7	1057·8	1007·6	0·214	1·870	3·6
1125·5	1058·6	1006·3	0·218	1·866	3·8
1126·3	1059·3	1005·0	0·221	1·862	4·0

TABLE V.

PROPERTIES OF SATURATED STEAM ON PRESSURE

Pressure in lbs. per square inch. *p.*	Temperature in degrees Fahrenheit. T.	Absolute temperature in degrees Fahrenheit. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in B. Th. U. *i.*	Internal heat of water in B. Th. U. *e.*
4·2	154·9	614·3	86·42	123·3	123·3
4·4	156·8	616·2	82·74	125·2	125·2
4·6	158·7	618·1	79·35	127·1	127·1
4·8	160·5	619·9	76·25	128·9	128·9
5·0	162·3	621·7	73·39	130·7	130·7
6	170·1	629·5	61·87	138·6	138·6
7	176·9	636·3	53·56	145·4	145·4
8	182·9	642·3	47·27	151·4	151·4
9	188·2	647·6	42·33	156·8	156·8
10	193·3	652·7	38·37	161·9	161·9
11	197·8	657·2	35·09	166·5	166·5
12	202·0	661·4	32·35	170·8	170·8
13	205·9	665·3	30·01	174·8	174·8
14	209·7	669·3	28·01	178·6	178·6
14·7	212·0	671·4	26·75	180·9	180·8
15	213·0	672·4	26·25	182·0	181·9
16	216·3	675·7	24·71	185·4	185·3
17	219·4	678·8	23·35	188·5	188·4
18	222·4	681·8	22·14	191·5	191·4
19	225·1	684·5	21·04	194·2	194·1
20	227·8	687·2	20·06	196·9	196·8
21	230·5	689·9	19·16	199·6	199·5
22	233·0	692·4	18·35	202·2	202·1
23	235·4	694·8	17·60	204·6	204·5
24	237·7	697·1	16·91	206·9	206·8
25	240·0	699·4	16·28	209·2	209·1
26	242·2	701·6	15·70	211·5	211·4
27	244·4	703·8	15·16	213·7	213·6
28	246·4	705·8	14·65	215·8	215·7
29	248·4	707·8	14·18	217·8	217·7
30	250·3	709·7	13·73	219·8	219·7
31	252·2	711·6	13·31	221·7	221·6
32	254·0	713·4	12·92	223·6	223·5
33	255·7	715·1	12·56	225·4	225·3
34	257·5	716·9	12·22	227·2	227·1
35	259·2	718·6	11·89	229·0	228·9

(*continued*).

BASE (**POUND-FAHRENHEIT** UNITS) (*continued*).

Total heat of steam in B. Th. U. I.	Internal heat of steam in B. Th. U. E.	Latent heat of steam in B. Th. U. L.	Entropy of water in ranks. ϕ_w	Entropy of steam in ranks. ϕ_s	Pressure in lbs. per square inch. p.
1127·1	1060·0	1003·9	0·224	1·858	4·2
1128·0	1060·6	1002·8	0·227	1·854	4·4
1128·9	1061·2	1001·8	0·230	1·850	4·6
1129·7	1061·8	1000·8	0·233	1·847	4·8
1130·5	1062·4	999·8	0·236	1·844	5·0
1133·8	1065·0	995·2	0·2483	1·829	6
1136·7	1067·2	991·3	0·2593	1·817	7
1139·2	1069·2	987·8	0·2687	1·807	8
1141·5	1071·0	984·7	0·2771	1·797	9
1143·7	1072·6	981·8	0·2849	1·789	10
1145·6	1074·1	979·1	0·2918	1·782	11
1147·3	1075·5	976·5	0·2983	1·775	12
1148·9	1076·7	974·1	0·3042	1·768	13
1150·4	1077·8	971·8	0·3098	1·762	14
1151·4	1078·6	970·5	0·3136	1·759	14·7
1151·8	1078·8	969·7	0·3151	1·757	15
1153·1	1079·9	967·7	0·3200	1·752	16
1154·3	1080·9	965·8	0·3246	1·748	17
1155·5	1081·8	964·1	0·3290	1·743	18
1156·7	1082·7	962·4	0·3332	1·739	19
1157·8	1083·6	960·8	0·3371	1·735	20
1158·8	1084·4	959·2	0·3409	1·731	21
1159·7	1085·1	957·6	0·3446	1·727	22
1160·6	1085·7	956·1	0·3481	1·724	23
1161·5	1086·3	954·6	0·3515	1·720	24
1162·3	1086·9	953·1	0·3548	1·717	25
1163·2	1087·5	951·7	0·3580	1·714	26
1164·0	1088·1	950·3	0·3610	1·711	27
1164·8	1088·7	949·0	0·3639	1·708	28
1165·5	1089·2	947·7	0·3668	1·705	29
1166·2	1089·8	946·4	0·3696	1·703	30
1166·9	1090·3	945·2	0·3723	1·700	31
1167·6	1090·8	944·0	0·3749	1·698	32
1168·2	1091·3	942·8	0·3775	1·696	33
1168·8	1091·8	941·6	0·3800	1·693	34
1169·5	1092 3	940·5	0·3824	1·691	35

TABLE V.

Properties of Saturated Steam on Pressure

Pressure in lbs. per square inch. p.	Temperature in degrees Fahrenheit. T.	Absolute temperature in degrees Fahrenheit. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in B. Th. U. i.	Internal heat of water in B. Th. U. e.
36	260·9	720·3	11·58	230·7	230·6
37	262·5	721·9	11·29	232·4	232·3
38	264·1	723·5	11·01	234·0	233·9
39	265·6	725·0	10·74	235·6	235·5
40	267·1	726·5	10·48	237·1	237·0
41	268·5	727·9	10·24	238·5	238·4
42	270·0	729·4	10·00	240·0	239·9
43	271·5	730·9	9·787	241·5	241·4
44	272·9	731·3	9·587	243·0	242·9
45	274·3	733·7	9·393	244·4	214·3
46	275·7	735·1	9·205	245·8	245·7
47	277·1	736·5	9·023	247·2	247·1
48	278·4	737·8	8·847	248·5	248·4
49	279·7	739·1	8·677	249·8	249·7
50	280·9	740·3	8·513	251·0	250·9
51	282·1	741·5	8·354	252·3	252·2
52	283·3	742·7	8·203	253·6	253·5
53	284·5	743·9	8·058	254·8	254·6
54	285·7	745·1	7·918	256·0	255·8
55	286·9	746·3	7·783	257·2	257·0
56	288·0	747·4	7·652	258·4	258·2
57	289·2	748·6	7·526	259·6	259·4
58	290·3	749·7	7·405	260·7	260·5
59	291·4	750·8	7·288	261·9	261·7
60	292·5	751·9	7·175	263·0	262·8
61	293·6	753·0	7·066	264·1	263·9
62	294·7	754·1	6·960	265·2	265·0
63	295·7	755·1	6·857	266·3	266·1
64	296·8	756·2	6·756	267·4	267·2
65	297·8	757·2	6·657	268·5	268·3
66	298·8	758·2	6·561	269·6	269·4
67	299·8	759·2	6·469	270·6	270·4
68	300·8	760·2	6·380	271·6	271·4
69	301·8	761·2	6·294	272·6	272·4
70	302·7	762·1	6·211	273·6	273·4

(*continued*).

BASE (**POUND-FAHRENHEIT** UNITS) (*continued*).

Total heat of steam in B. Th. U. I.	Internal heat of steam in B. Th. U. E.	Latent heat of steam in B. Th. U. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
1170·1	1092·8	939·4	0·3848	1·689	36
1170·7	1093·2	938·3	0·3871	1·687	37
1171·2	1093·7	937·2	0·3893	1·685	38
1171·7	1094·1	936·1	0·3915	1·683	39
1172·2	1094·5	935·1	0·3936	1·681	40
1172·7	1094·9	934·1	0·3957	1·679	41
1173·2	1095·3	933·1	0·3978	1·677	42
1173·7	1095·7	932·2	0·3998	1·675	43
1174·2	1096·0	931·2	0·4018	1·673	44
1174·7	1096·4	930·3	0·4037	1·671	45
1175·2	1096·8	929·4	0·4056	1·669	46
1175·7	1097·1	928·5	0·4075	1·668	47
1176·1	1097·5	927·6	0·4093	1·666	48
1176·5	1097·8	926·7	0·4111	1·664	49
1176·9	1098·1	925·8	0·4129	1·663	50
1177·3	1098·4	924·9	0·4146	1·661	51
1177·7	1098·7	924·1	0·4163	1·660	52
1178·1	1099·0	923·3	0·4180	1·658	53
1178·5	1099·3	922·5	0·4196	1·657	54
1178·9	1099·6	921·7	0·4212	1·656	55
1179·3	1099·9·	920·9	0·4228	1·654	56
1179·7	1100·2	920·1	0·4243	1·653	57
1180·0	1100·4	919·3	0·4258	1·651	58
1180·4	1100·7	918·5	0·4273	1·650	59
1180·8	1101·0	917·8	0·4288	1·649	60
1181·1	1101·2	917·0	0·4303	1·647	61
1181·5	1101·5	916·2	0·4318	1·646	62
1181·8	1101·8	915·5	0·4332	1·645	63
1182·2	1102·0	914·8	0·4346	1·644	64
1182·6	1102·3	914·1	0·4360	1·643	65
1183·0	1102·6	913·4	0·4374	1·641	66
1183·3	1102·9	912·7	0·4387	1·640	67
1183·6	1103·1	912·0	0·4401	1·639	68
1183·9	1103·4	911·3	0·4414	1·638	69
1184·2	1103·6	910·6	0·4427	1·637	70

TABLE V.

Properties of Saturated Steam on Pressure

Pressure in lbs. per square inch. p.	Temperature in degrees Fahrenheit. T.	Absolute temperature in degrees Fahrenheit. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in B. Th. U. i.	Internal heat of water in B. Th. U. e.
71	303·7	763·1	6·130	274·6	274·4
72	304·6	764·0	6·051	275·5	275·3
73	305·6	765·0	5·973	276·5	276·3
74	306·5	765·9	5·897	277·4	277·2
75	307·4	766·8	5·822	278·3	278·1
76	308·3	767·7	5·750	279·3	279·0
77	309·2	768·6	5·680	280·2	279·9
78	310·1	769·5	5·612	281·1	280·8
79	311·0	770·4	5·546	282·0	281·7
80	311·8	771·2	5·481	282·9	282·6
81	312·7	772·1	5·417	283·8	283·5
82	313·6	773·0	5·355	284·7	284·4
83	314·4	773·8	5·295	285·6	285·3
84	315·2	774·6	5·236	286·5	286·2
85	316·0	775·4	5·179	287·3	287·0
86	316·8	776·2	5·123	288·2	287·9
87	317·6	777·0	5·068	289·0	288·7
88	318·4	777·8	5·014	289·8	289·5
89	319·2	778·6	4·961	290·6	290·3
90	320·0	779·4	4·908	291·4	291·1
91	320·8	780·2	4·856	292·2	291·9
92	321·5	780·9	4·806	293·0	292·7
93	322·3	781·7	4·758	293·8	293·5
94	324·1	782·5	4·711	294·6	294·3
95	323·8	783·2	4·665	295·4	295·1
96	324·6	784·0	4·620	296·2	295·9
97	325·3	784·7	4·575	296·9	296·6
98	326·1	785·5	4·531	297·7	297·4
99	326·9	786·3	4·488	298·5	298·2
100	327·6	787·0	4·446	299·2	298·9
101	328·3	787·7	4·404	300·0	299·7
102	329·0	788·4	4·363	300·7	300·4
103	329·7	789·1	4·323	301·4	301·1
104	330·4	789·8	4·284	302·1	301·8
105	331·0	790·4	4·246	302·8	302·5

(*continued*).

BASE (**POUND-FAHRENHEIT** UNITS) (*continued*).

Total heat of steam in B. Th. U. I.	Internal heat of steam in B. Th. U. E.	Latent heat of steam in B. Th. U. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
1184·5	1103·9	909·9	0·4440	1·636	71
1184·7	1104·1	909·2	0·4453	1·635	72
1185·0	1104·3	908·5	0·4465	1·634	73
1185·3	1104·6	907·8	0·4478	1·633	74
1185·6	1104·8	907·2	0·4490	1·632	75
1185·8	1105·0	906·5	0·4502	1·631	76
1186·1	1105·2	905·8	0·4514	1·630	77
1186·4	1105·4	905·2	0·4526	1·629	78
1186·7	1105·6	904·6	0·4538	1·628	79
1187·0	1105·8	904·0	0·4550	1·627	80
1187·2	1106·0	903·4	0·4561	1·626	81
1187·5	1106·2	902·8	0·4572	1·625	82
1187·8	1106·4	902·2	0·4583	1·624	83
1188·1	1106·6	901·6	0·4594	1·623	84
1188·3	1106·8	901·1	0·4604	1·622	85
1188·6	1107·0	900·5	0·4615	1·621	86
1188·9	1107·2	899·9	0·4626	1·620	87
1189·1	1107·4	899·3	0·4636	1·619	88
1189·3	1107·5	898·7	0·4647	1·618	89
1189·6	1107·7	898·2	0·4657	1·618	90
1189·8	1107·9	897·6	0·4667	1·617	91
1190·0	1108·1	897·0	0·4677	1·616	92
1190·3	1108·2	896·5	0·4687	1·615	93
1190·5	1108·4	895·9	0·4697	1·614	94
1190·8	1108·6	895·4	0·4707	1·614	95
1191·0	1108·7	894·8	0·4716	1·613	96
1191·2	1108·9	894·2	0·4726	1·612	97
1191·4	1109·0	893·7	0·4736	1·611	98
1191·6	1109·1	893·1	0·4745	1·610	99
1191·8	1109·3	892·6	0·4755	1·610	100
1192·0	1109·5	892·0	0·4764	1·609	101
1192·2	1109·6	891·5	0·4774	1·608	102
1192·4	1109·8	891·0	0·4783	1·607	103
1192·5	1109·9	890·4	0·4792	1·606	104
1192·7	1110·1	889·9	0·4801	1·606	105

TABLE V.

Properties of Saturated Steam on Pressure

Pressure in lbs. per square inch. p.	Temperature in degrees Fahrenheit. T.	Absolute temperature in degrees Fahrenheit. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in B. Th. U. i.	Internal heat of water in B. Th. U. e.
106	331·6	791·0	4·208	303·5	303·2
107	332·3	791·7	4·171	304·2	303·9
108	333·0	792·4	4·135	304·9	304·6
109	333·7	793·1	4·100	305·6	305·3
110	334·4	793·8	4·065	306·3	306·0
111	335·0	794·4	4·030	306·9	306·6
112	335·7	795·1	3·996	307·6	307·3
113	336·4	795·8	3·963	308·3	308·0
114	337·0	796·4	3·931	308·9	308·6
115	337·7	797·1	3·899	309·6	309·3
116	338·4	797·8	3·867	310·3	310·0
117	339·0	798·4	3·836	311·0	310·6
118	339·6	799·0	3·805	311·7	311·3
119	340·2	799·6	3·775	312·3	311·9
120	340·9	800·3	3·746	313·0	312·6
121	341·5	800·9	3·717	313·6	313·2
122	342·1	801·5	3·688	314·3	313·9
123	342·8	802·2	3·660	315·0	314·6
124	343·4	802·8	3·632	315·6	315·2
125	344·0	803·4	3·605	316·2	315·8
126	344·6	804·0	3·578	316·9	316·5
127	345·2	804·6	3·552	317·5	317·1
128	345·8	805·2	3·526	318·1	317·7
129	346·4	805·8	3·500	318·7	318·3
130	347·0	806·4	3·475	319·3	318·9
131	347·6	807·0	3·450	320·0	319·6
132	348·1	807·5	3·425	320·6	320·2
133	348·7	808·1	3·401	321·2	320·8
134	349·3	808·7	3·377	321·8	321·4
135	349·9	809·3	3·354	322·4	322·0
136	350·4	809·8	3·331	323·0	322·6
137	351·0	810·4	3·308	323·6	323·2
138	351·6	811·0	3·285	324·2	323·8
139	352·1	811·5	3·263	324·8	324·4
140	352·7	812·1	3·241	325·4	325·0

(*continued*).

BASE (**POUND-FAHRENHEIT** UNITS) (*continued*).

Total heat of steam in B. Th. U. I.	Internal heat of steam in B. Th. U. E.	Latent heat of steam in B. Th. U. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
1192·9	1110·3	889·4	0·4810	1·605	106
1193·0	1110·4	888·8	0·4819	1·604	107
1193·2	1110·6	888·3	0·4828	1·603	108
1193·4	1110·7	887·8	0·4837	1·602	109
1193·6	1110·8	887·3	0·4845	1·602	110
1193·7	1111·0	886·8	0·4854	1·601	111
1193·9	1111·1	886·3	0·4862	1·601	112
1194·1	1111·3	885·8	0·4871	1·600	113
1194·3	1111·4	885·3	0·4880	1·599	114
1194·5	1111·5	884·8	0·4888	1·599	115
1194·6	1111·6	884·3	0·4897	1·598	116
1194·8	1111·8	883·8	0·4905	1·598	117
1195·0	1111·9	883·3	0·4913	1·597	118
1195·2	1112·0	882·8	0·4921	1·596	119
1195·4	1112·1	882·4	0·4929	1·596	120
1195·5	1112·2	881·9	0·4937	1·595	121
1195·7	1112·4	881·4	0·4945	1·594	122
1195·9	1112·5	880·9	0·4953	1·594	123
1196·0	1112·6	880·4	0·4961	1·593	124
1196·2	1112·7	880·0	0·4969	1·592	125
1196·4	1112·8	879·5	0·4977	1·592	126
1196·6	1113·0	879·1	0·4984	1·591	127
1196·7	1113·1	878·6	0·4992	1·590	128
1196·9	1113·2	878·1	0·5000	1·590	129
1197·0	1113·3	877·7	0·5008	1·589	130
1197·2	1113·5	877·2	0·5016	1·589	131
1197·4	1113·6	876·8	0·5023	1·588	132
1197·5	1113·7	876·4	0·5031	1·588	133
1197·7	1113·9	875·9	0·5039	1·587	134
1197·8	1114·0	875·5	0·5046	1·586	135
1198·0	1114·1	875·0	0·5054	1·586	136
1198·2	1114·2	874·6	0·5061	1·585	137
1198·3	1114·4	874·1	0·5068	1·584	138
1198·5	1114·5	873·7	0·5075	1·584	139
1198·6	1114·6	873·2	0·5082	1·583	140

TABLE V.

Properties of Saturated Steam on Pressure

Pressure in lbs. per square inch. p.	Temperature in degrees Fahrenheit. T.	Absolute temperature in in degrees Fahrenheit. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in B. Th. U. i.	Internal heat of water in B. Th. U. e.
141	353·3	812·7	3·219	326·0	325·6
142	353·8	813·2	3·198	326·5	326·1
143	354·4	813·8	3·177	327·1	326·7
144	355·0	814·4	3·156	327·7	327·3
145	355·5	814·9	3·136	328·3	327·9
146	356·1	815·5	3·116	328·9	328·5
147	356·6	816·0	3·096	329·4	329·0
148	357·1	816·5	3·076	330·0	329·6
149	357·6	817·0	3·056	330·5	330·1
150	358·1	817·5	3·037	331·0	330·6
151	358·7	818·1	3·018	331·6	331·2
152	359·2	818·6	2·999	332·1	331·7
153	359·7	819·1	2·981	332·7	332·2
154	360·2	819·6	2·963	333·2	332·7
155	360·7	820·1	2·945	333·7	333·2
156	361·2	820·6	2·927	334·3	333·8
157	361·7	821·1	2·909	334·8	334·3
158	362·2	821·6	2·892	335·3	334·8
159	362·7	822·1	2·875	335·8	335·3
160	363·2	822·6	2·858	336·3	335·8
161	363·8	823·2	2·841	336·9	336·4
162	364·3	823·7	2·824	337·4	336·9
163	364·8	824·2	2·808	337·9	337·4
164	365·3	824·7	2·792	338·4	337·9
165	365·8	825·2	2·776	338·9	338·4
166	366·3	825·7	2·740	339·4	338·9
167	366·8	826·2	2·765	339·9	339·4
168	367·3	826·7	2·730	340·4	339·9
169	367·8	827·2	2·715	340·9	340·4
170	368·2	827·6	2·700	341·4	340·9
171	368·7	828·1	2·685	341·9	341·4
172	369·2	828·6	2·670	342·4	341·9
173	369·6	829·0	2·655	342·8	342·3
174	370·1	829·5	2·641	343·3	342·8
175	370·5	829·9	2·627	343·8	343·3

(*continued*).

BASE (**POUND-FAHRENHEIT** UNITS) (*continued*).

Total heat of steam in B. Th. U. I.	Internal heat of steam in B. Th. U. E.	Latent heat of steam in B. Th. U. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
1198·8	1114·7	872·8	0·5089	1·583	141
1198·9	1114·8	872·3	0·5096	1·582	142
1199·0	1114·9	871·9	0·5103	1·582	143
1199·2	1115·0	871·4	0·5110	1·581	144
1199·3	1115·1	871·0	0·5117	1·580	145
1199·5	1115·2	870·6	0·5124	1·580	146
1199·6	1115·3	870·1	0·5131	1·579	147
1199·7	1115·4	869·7	0·5138	1·579	148
1199·8	1115·5	869·3	0·5145	1·578	149
1200·0	1115·6	868·9	0·5151	1·578	150
1200·1	1115·7	868·5	0·5158	1·577	151
1200·2	1115·8	868·1	0·5164	1·577	152
1200·4	1115·9	867·7	0·5171	1·576	153
1200·5	1116·0	867·3	0·5177	1·576	154
1200·6	1116·0	866·9	0·5183	1·575	155
1200·8	1116·1	866·5	0·5190	1·575	156
1200·9	1116·2	866·1	0·5196	1·574	157
1201·0	1116·3	865·7	0·5203	1·574	158
1201·1	1116·4	865·3	0·5209	1·573	159
1201·2	1116·5	864·9	0·5215	1·573	160
1201·4	1116·6	864·5	0·5222	1·572	161
1201·5	1116·7	864·1	0·5228	1·572	162
1201·6	1116·8	863·7	0·5234	1·571	163
1201·7	1116·9	863·3	0·5240	1·571	164
1201·8	1117·0	862·9	0·5246	1·570	165
1201·9	1117·1	862·5	0·5252	1·570	166
1202·0	1117·2	862·1	0·5258	1·569	167
1202·2	1117·3	861·8	0·5264	1·569	168
1202·3	1117·4	861·4	0·5270	1·569	169
1202·4	1117·4	861·0	0·5276	1·568	170
1202·6	1117·5	860·7	0·5282	1·568	171
1202·7	1117·6	860·3	0·5288	1·568	172
1202·8	1117·7	859·9	0·5294	1·567	173
1202·9	1117·8	859·5	0·5300	1·567	174
1203·0	1117·8	859·2	0·5305	1·566	175

TABLE V.

Properties of Saturated Steam on Pressure

Pressure in lbs. per square inch. p.	Temperature in degrees Fahrenheit. T.	Absolute temperature in degrees Fahrenheit. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in B. Th. U. i.	Internal heat of water in B. Th. U. e.
176	371·0	830·4	2·613	344·3	343·8
177	371·4	830·8	2·599	344·7	344·2
178	371·9	831·3	2·585	345·2	344·7
179	372·3	831·7	2·571	345·7	345·2
180	372·8	832·2	2·558	346·2	345·7
181	373·3	832·7	2·545	346·7	346·2
182	373·7	833·1	2·532	347·2	346·6
183	374·2	833·6	2·519	347·7	347·1
184	374·6	834·0	2·506	348·2	347·6
185	375·1	834·5	2·493	348·7	348·1
186	375·6	835·0	2·480	349·2	348·6
187	376·0	835·4	2·467	349·6	349·0
188	376·4	835·8	2·455	350·1	349·5
189	376·9	836·3	2·443	350·6	350·0
190	377·3	836·7	2·431	351·0	350·4
191	377·7	837·1	2·419	351·4	350·8
192	378·2	837·6	2·407	351·9	351·3
193	378·6	838·0	2·395	352·3	351·7
194	379·0	838·4	2·383	352·8	352·2
195	379·4	838·8	2·372	353·2	352·6
196	379·9	839·3	2·361	353·7	353·1
197	380·3	839·7	2·349	354·1	353·5
198	380·7	840·1	2·338	354·6	354·0
199	381·2	840·6	2·327	355·1	354·5
200	381·6	841·0	2·316	355·5	354·9
201	382·0	841·4	2·305	356·0	355·4
202	382·4	841·8	2·294	356·4	355·8
203	382·9	842·3	2·283	356·9	356·3
204	383·3	842·7	2·273	357·3	356·7
205	383·7	843·1	2·263	357·7	357·1
206	384·1	843·5	2·253	358·1	357·5
207	384·5	843·9	2·243	358·5	357·9
208	385·0	844·4	2·233	359·0	358·4
209	385·4	844·8	2·223	359·4	358·8
210	385·8	845·2	2·213	359·8	359·2

(*continued*).

BASE (**POUND-FAHRENHEIT** UNITS) (*continued*).

Total heat of steam in B. Th. U. I.	Internal heat of steam in B. Th. U. E.	Latent heat of steam in B. Th. U. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
1203·1	1117·9	858·8	0·5311	1·566	176
1203·2	1118·0	858·4	0·5317	1·565	177
1203·3	1118·1	858·1	0·5323	1·565	178
1203·4	1118·2	857·7	0·5329	1·564	179
1203·5	1118·2	857·3	0·5334	1·564	180
1203·6	1118·3	856·9	0·5340	1·563	181
1203·7	1118·4	856·5	0·5345	1·563	182
1203·8	1118·5	856·1	0·5351	1·562	183
1204·0	1118·6	855·8	0·5356	1·562	184
1204·1	1118·6	855·4	0·5362	1·561	185
1204·2	1118·7	855·0	0·5367	1·561	186
1204·3	1118·8	854·7	0·5373	1·560	187
1204·4	1118·9	854·3	0·5379	1·560	188
1204·5	1118·9	853·9	0·5384	1·559	189
1204·6	1119·0	853·6	0·5390	1·559	190
1204·7	1119·1	853·2	0·5395	1·559	191
1204·8	1119·2	852·9	0·5401	1·558	192
1204·9	1119·3	852·6	0·5406	1·558	193
1205·0	1119·3	852·2	0·5412	1·558	194
1205·1	1119·4	851·9	0·5417	1·557	195
1205·2	1119·4	851·5	0·5422	1·557	196
1205·3	1119·5	851·2	0·5428	1·556	197
1205·4	1119·6	850·8	0·5433	1·556	198
1205·5	1119·6	850·5	0·5439	1·556	199
1205·6	1119·8	850·2	0·5444	1·555	200
1205·7	1119·9	849·8	0·5449	1·555	201
1205·8	1120·0	849·5	0·5455	1·555	202
1205·9	1120·0	849·1	0·5460	1·554	203
1206·0	1120·1	848·8	0·5465	1·554	204
1206·1	1120·2	848·4	0·5470	1·554	205
1206·2	1120·2	848·1	0·5476	1·553	206
1206·3	1120·3	847·7	0·5481	1·553	207
1206·4	1120·4	847·4	0·5486	1·553	208
1206·4	1120·5	847·0	0·5491	1·552	209
1206·5	1120·5	846·7	0·5496	1·552	210

TABLE V.

Properties of Saturated Steam on Pressure

Pressure in lbs. per square inch. p.	Temperature in degrees Fahrenheit. T.	Absolute temperature in degrees Fahrenheit. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in B. Th. U. i.	Internal heat of water in B. Th. U. e.
211	386·2	845·6	2·203	360·2	359·6
212	386·6	846·0	2·193	360·6	360·0
213	387·0	846·4	2·183	361·1	360·5
214	387·4	846·8	2·173	361·5	360·9
215	387·8	847·2	2·164	361·9	361·3
216	388·2	847·6	2·154	362·3	361·7
217	388·6	848·0	2·145	362·8	362·2
218	388·9	848·3	2·136	363·2	362·6
219	389·3	848·7	2·127	363·6	363·0
220	389·7	849·1	2·118	364·0	363·4
221	390·1	849·5	2·109	364·4	363·8
222	390·5	849·9	2·100	364·8	364·2
223	390·8	850·2	2·091	365·2	364·6
224	391·2	850·6	2·082	365·6	365·0
225	391·6	851·0	2·073	366·0	365·4
226	392·0	851·4	2·065	366·5	365·8
227	392·4	851·8	2·056	366·9	366·2
228	392·7	852·1	2·047	367·3	366·6
229	393·1	852·5	2·039	367·7	367·0
230	393·5	852·9	2·031	368·1	367·4
231	393·9	853·3	2·022	368·5	367·8
232	394·3	853·7	2·014	368·9	368·2
233	394·6	854·0	2·006	369·2	368·5
234	395·0	854·4	1·998	369·6	368·9
235	395·4	854·8	1·990	370·0	369·3
236	395·8	855·2	1·982	370·4	369·7
237	396·1	855·5	1·974	370·7	370·0
238	396·5	855·9	1·966	371·1	370·4
239	396·8	856·2	1·958	371·5	370·8
240	397·2	856·6	1·950	371·9	371·2
241	397·6	857·0	1·942	372·3	371·6
242	397·9	857·3	1·934	372·6	371·9
243	398·3	857·7	1·926	373·0	372·3
244	398·6	858·0	1·919	373·4	372·7
245	399·0	858·4	1·912	373·8	373·1

(*continued*).

BASE (**POUND-FAHRENHEIT** UNITS) (*continued*).

Total heat of steam in B. Th. U. I.	Internal heat of steam in B. Th. U. E.	Latent heat of steam in B. Th. U. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
1206·5	1120·6	846·3	0·5501	1·552	211
1206·6	1120·7	846·0	0·5506	1·551	212
1206·7	1120·7	845·7	0·5510	1·551	213
1206·8	1120·8	845·3	0·5515	1·551	214
1206·9	1120·9	845·0	0·5520	1·550	215
1207·0	1120·9	844·7	0·5525	1·550	216
1207·1	1121·0	844·4	0·5530	1·549	217
1207·2	1121·1	844·0	0·5534	1·549	218
1207·3	1121·2	843·7	0·5539	1·549	219
1207·4	1121·2	843·4	0·5544	1·548	220
1207·5	1121·3	843·1	0·5549	1·548	221
1207·6	1121·4	842·8	0·5554	1·548	222
1207·6	1121·4	842·4	0·5558	1·547	223
1207·7	1121·5	842·1	0·5563	1·547	224
1207·8	1121·6	841·8	0·5568	1·546	225
1207·9	1121·6	841·5	0·5572	1·546	226
1208·0	1121·7	841·1	0·5577	1·546	227
1208·1	1121·8	840·8	0·5582	1·545	228
1208·2	1121·8	840·5	0·5587	1·545	229
1208·3	1121·9	840·2	0·5591	1·544	230
1208·3	1122·0	839·9	0·5596	1·544	231
1208·4	1122·0	839·6	0·5600	1·544	232
1208·5	1122·1	839·3	0·5605	1·543	233
1208·6	1122·2	839·0	0·5610	1·543	234
1208·7	1122·2	838·7	0·5614	1·543	235
1208·8	1122·3	838·4	0·5619	1·542	236
1208·9	1122·3	838·1	0·5623	1·542	237
1209·0	1122·4	837·8	0·5628	1·542	238
1209·1	1122·4	837·5	0·5632	1·541	239
1209·2	1122·5	837·3	0·5637	1·541	240
1209·3	1122·6	837·0	0·5641	1·541	241
1209·3	1122·6	836·7	0·5646	1·541	242
1209·4	1122·7	836·4	0·5650	1·540	243
1209·5	1122·7	836·1	0·5655	1·540	244
1209·6	1122·8	835·8	0·5659	1·540	245

TABLE V.

Properties of Saturated Steam on Pressure

Pressure in lbs. per square inch. p.	Temperature in degrees Fahrenheit. T.	Absolute temperature in degrees Fahrenheit. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in B. Th. U. i.	Internal heat of water in B. Th. U. e.
246	399·4	858·8	1·905	374·2	373·5
247	399·7	859·1	1·898	374·5	373·8
248	400·1	859·5	1·891	374·9	374·2
249	400·5	859·9	1·884	375·3	374·6
250	400·8	860·2	1·877	375·6	374·9
251	401·2	860·6	1·870	376·0	375·3
252	401·5	860·9	1·863	376·4	375·6
253	401·9	861·3	1·856	376·8	376·0
254	402·2	861·6	1·849	377·2	376·4
255	402·5	861·9	1·842	377·5	376·7
256	402·9	862·3	1·835	377·9	377·1
257	403·2	862·6	1·828	378·2	377·4
258	403·5	862·9	1·822	378·6	377·8
259	403·9	863·3	1·815	379·0	378·2
260	404·2	863·6	1·809	379·3	378·5
261	404·6	864·0	1·802	379·7	378·9
262	404·9	864·3	1·796	380·0	379·2
263	405·3	864·7	1·789	380·4	379·6
264	405·6	865·0	1·783	380·7	379·9
265	405·9	865·3	1·777	381·1	380·3
266	406·3	865·7	1·770	381·5	380·7
267	406·6	866·0	1·764	381·8	381·0
268	407·0	866·4	1·758	382·2	381·4
269	407·3	866·7	1·752	382·6	381·8
270	407·6	867·0	1·746	382·9	382·1
271	408·0	867·4	1·740	383·3	382·5
272	408·3	867·7	1·734	383·6	382·8
273	408·7	868·1	1·728	384·0	383·2
274	409·0	868·4	1·722	384·3	383·5
275	409·3	868·7	1·716	384·6	383·8
276	409·7	869·1	1·710	385·0	384·2
277	410·0	869·4	1·704	385·3	384·5
278	410·3	869·7	1·698	385·7	384·9
279	410·6	870·0	1·692	386·0	385·2
280	410·9	870·3	1·687	386·3	385·5

(*continued*).

BASE (**POUND-FAHRENHEIT** UNITS) (*continued*).

Total heat of steam in B. Th. U. I.	Internal heat of steam in B. Th. U. E.	Latent heat of steam in B. Th. U. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
1209·7	1122·8	835·5	0·5663	1·539	246
1209·7	1122·9	835·2	0·5668	1·539	247
1209·8	1122·9	834·9	0·5672	1·539	248
1209·9	1123·0	834·6	0·5677	1·538	249
1210·0	1123·0	834·3	0·5681	1·538	250
1210·0	1123·1	834·0	0·5686	1·538	251
1210·1	1123·1	833·7	0·5690	1·537	252
1210·2	1123·2	833·4	0·5694	1·537	253
1210·3	1123·3	833·1	0·5698	1·537	254
1210·3	1123·3	832·8	0·5702	1·536	255
1210·4	1123·4	832·5	0·5707	1·536	256
1210·5	1123·4	832·2	0·5711	1·536	257
1210·5	1123·5	831·9	0·5715	1·535	258
1210·6	1123·5	831·6	0·5719	1·535	259
1210·7	1123·6	831·4	0·5723	1·535	260
1210·8	1123·6	831·1	0·5727	1·534	261
1210·8	1123·7	830·8	0·5731	1·534	262
1210·9	1123·7	830·5	0·5735	1·534	263
1211·0	1123·8	830·2	0·5739	1·534	264
1211·0	1123·8	829·9	0·5743	1·533	265
1211·1	1123·9	829·6	0·5747	1·533	266
1211·1	1123·9	829·3	0·5751	1·533	267
1211·2	1124·0	829·0	0·5755	1·532	268
1211·3	1124·0	828·7	0·5759	1·532	269
1211·4	1124·1	828·5	0·5763	1·532	270
1211·5	1124·1	828·2	0·5767	1·532	271
1211·5	1124·2	827·9	0·5771	1·531	272
1211·6	1124·2	827·6	0·5775	1·531	273
1211·6	1124·3	827·3	0·5779	1·531	274
1211·7	1124·3	827·1	0·5783	1·530	275
1211·8	1124·3	826·8	0·5786	1·530	276
1211·8	1124·4	826·5	0·5790	1·530	277
1211·9	1124·4	826·2	0·5794	1·530	278
1211·9	1124·4	825·9	0·5798	1·529	279
1212·0	1124·5	825·7	0·5802	1·529	280

TABLE V.

Properties of Saturated Steam on Pressure

Pressure in lbs. per square inch. p.	Temperature in degrees Fahrenheit. T.	Absolute temperature in degrees Fahrenheit. θ.	Specific volume in cubic feet per lb. V.	Total heat of water in B. Th. U. i.	Internal heat of water in B. Th. U. e.
281	411·3	870·7	1·681	386·7	385·9
282	411·6	871·0	1·676	387·0	386·2
283	411·9	871·3	1·670	387·3	386·5
284	412·2	871·6	1·665	387·7	386·9
285	412·5	871·9	1·659	388·0	387·2
286	412·8	872·2	1·654	388·4	387·5
287	413·1	872·5	1·648	388·7	387·8
288	413·4	872·8	1·643	389·1	388·2
289	413·7	873·1	1·637	389·4	388·5
290	414·0	873·4	1·632	389·7	388·8
291	414·3	873·7	1·626	390·0	389·1
292	414·6	874·0	1·621	390·3	389·4
293	414·9	874·3	1·616	390·7	389·8
294	415·2	874·6	1·611	391·0	390·1
295	415·5	874·9	1·605	391·3	390·4
296	415·8	875·2	1·600	391·6	390·7
297	416·1	875·5	1·595	392·0	391·1
298	416·4	875·8	1·590	392·3	391·4
299	416·7	876·1	1·585	392·6	391·7
300	417·0	876·4	1·580	392·9	392·0

(continued).

BASE (**POUND-FAHRENHEIT** UNITS) *(continued).*

Total heat of steam in B. Th. U. I.	Internal heat of steam in B. Th. U. E.	Latent heat of steam in B. Th. U. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Pressure in lbs. per square inch. p.
1212·0	1124·5	825·4	0·5806	1·529	281
1212·1	1124·5	825·1	0·5810	1·528	282
1212·1	1124·6	824·8	0·5813	1·528	283
1212·2	1124·6	824·5	0·5817	1·528	284
1212·2	1124·6	824·3	0·5821	1·527	285
1212·3	1124·7	824·0	0·5824	1·527	286
1212·4	1124·7	823·7	0·5828	1·527	287
1212·4	1124·7	823·4	0·5832	1·527	288
1212·5	1124·8	823·1	0·5836	1·526	289
1212·5	1124·8	822·9	0·5839	1·526	290
1212·6	1124·8	822·6	0·5843	1·526	291
1212·6	1124·9	822·3	0·5846	1·525	292
1212·7	1124·9	822·0	0·5850	1·525	293
1212·7	1124·9	821·7	0·5854	1·525	294
1212·8	1125·0	821·5	0·5857	1·524	295
1212·8	1125·0	821·2	0·5861	1·524	296
1212·9	1125·1	820·9	0·5864	1·524	297
1212·9	1125·1	820·6	0·5868	1·523	298
1212·9	1125·1	820·3	0·5871	1·523	299
1213·0	1125·2	820·1	0·5875	1·523	300

TABLE

PROPERTIES OF SATURATED STEAM ON

Temperature in degrees Fahrenheit. T.	Absolute temperature in degrees Fahrenheit. θ.	Pressure in lbs. per square inch. p.	Specific volume in cubic feet per lb. V.	Total heat of water in B. Th. U. i.	Internal heat of water in B. Th. U. e.
80	539·4	0·502	637·9	48·0	48·0
82	541·4	0·536	599·5	50·0	50·0
84	543·4	0·572	564·2	52·0	52·0
86	545·4	0·610	530·8	54·0	54·0
88	547·4	0·650	500·6	56·1	56·0
90	549·4	0·692	471·6	58·1	58·1
92	551·4	0·737	444·0	60·1	60·1
94	553·4	0·785	418·6	62·1	62·1
96	555·4	0·835	395·1	64·1	64·1
98	557·4	0·888	392·9	66·1	66·1
100	559·4	0·943	352·3	68·1	68·1
102	561·4	1·002	332·9	70·1	70·1
104	563·4	1·063	314·6	72·1	72·1
106	565·4	1·127	297·6	74·1	74·1
108	567·4	1·196	281·4	76·1	76·1
110	569·4	1·267	266·5	78·1	78·1
112	571·4	1·343	252·4	80·1	80·1
114	573·4	1·422	239·3	82·1	82·1
116	575·4	1·504	227·0	84·1	84·1
118	577·4	1·592	215·2	86·2	86·1
120	579·4	1·684	204·0	88·2	88·1
122	581·4	1·780	193·6	90·2	90·1
124	583·4	1·881	183·8	92·2	92·2
126	585·4	1·986	174·6	94·2	94·2
128	587·4	2·097	166·0	96·2	96·2
130	589·4	2·213	157·8	98·2	98·2
132	591·4	2·344	150·2	100·2	100·2
134	593·4	2·461	142·8	102·2	102·2
136	595·4	2·594	136·0	104·2	104·2
138	597·4	2·734	129·4	106·3	106·2
140	599·4	2·879	123·3	108·3	108·2
142	601·4	3·031	117·5	110·3	110·2
144	603·4	3·189	112·0	112·3	112·2
146	605·4	3·354	106·9	114·3	114·3
148	607·4	3·528	101·9	116·3	116·3
150	609·4	3·707	97·17	118·3	118·3

VI.

FAHRENHEIT TEMPERATURE BASE.

Total heat of steam in B. Th. U. I.	Internal heat of steam in B. Th. U. E.	Latent heat of steam in B. Th. U. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Temperature in degrees Fahrenheit. T.
1093·0	1033·7	1045·0	0·0933	2·031	80
1093·9	1034·4	1043·9	0·0970	2·026	82
1094·9	1035·1	1042·8	0·1007	2·020	84
1095·8	1035·8	1041·8	0·1044	2·015	86
1096·7	1036·5	1040·7	0·1081	2·009	88
1097·6	1037·2	1039·6	0·1118	2·004	90
1098·6	1037·9	1038·5	0·1154	1·998	92
1099·5	1038·6	1037·4	0·1190	1·993	94
1100·5	1039·3	1036·4	0·1226	1·988	96
1101·4	1040·0	1035·3	0·1262	1·983	98
1102·3	1040·8	1034·2	0·1297	1·978	100
1103·2	1041·5	1033·1	0·1333	1·973	102
1104·1	1042·2	1032·0	0·1369	1·968	104
1105·1	1042·9	1031·0	0·1404	1·963	106
1106·0	1043·6	1029·9	0·1439	1·958	108
1106·9	1044·4	1028·8	0·1475	1·954	110
1107·8	1045·1	1027·7	0·1510	1·949	112
1108·7	1045·8	1026·6	0·1545	1·945	114
1109·6	1046·5	1025·5	0·1580	1·940	116
1110·6	1047·2	1024·4	0·1615	1·936	118
1111·5	1047·9	1023·3	0·1650	1·931	120
1112·4	1048·6	1022·2	0·1685	1·927	122
1113·3	1049·3	1021·1	0·1719	1·922	124
1114·2	1050·0	1020·0	0·1753	1·918	126
1115·1	1050·7	1018·9	0·1788	1·913	128
1116·0	1051·4	1017·8	0·1822	1·909	130
1116·9	·1052·1	1016·7	0·1856	1·904	132
1117·8	1052·8	1015·6	0·1890	1·900	134
1118·7	1053·5	1014·5	0·1924	1·896	136
1119·6	1054·2	1013·4	0·1958	1·892	138
1120·5	1054·8	1012·2	0·1991	1·888	140
1121·4	1055·5	1011·1	0·2025	1·884	142
1122·3	1056·2	1010·0	0·2058	1·880	144
1123·2	1056·9	1008·9	0·2091	1·876	146
1124·1	1057·6	1007·8	0·2124	1·872	148
1125·0	1058·3	1006·7	0·2157	1·868	150

TABLE VI.

PROPERTIES OF SATURATED STEAM ON

Temperature in degrees Fahrenheit. T.	Absolute temperature in degrees Fahrenheit. θ.	Pressure in lbs. per square inch. p.	Specific volume in cubic feet per lb. V.	Total heat of water in B. Th. U. i.	Internal heat of water in B. Th. U. e.
152	611·4	3·895	92·78	120·3	120·3
154	613·4	4·091	88·60	122·4	122·3
156	615·4	4·297	84·64	124·4	124·3
158	617·4	4·508	80·90	126·4	126·3
160	619·4	4·729	77·37	128·4	128·4
162	621·4	4·960	74·01	130·4	130·4
164	623·4	5·201	70·81	132·4	132·4
166	625·4	5·451	67·77	134·4	134·4
168	627·4	5·711	64·86	136·5	136·4
170	629·4	5·981	62·06	138·5	138·4
172	631·4	6·260	59·45	140·5	140·4
174	633·4	6·553	56·96	142·5	142·4
176	635·4	6·857	54·60	144·5	144·5
178	637·4	7·175	52·34	146·5	146·5
180	639·4	7·500	50·20	148·6	148·5
182	641·4	7·840	48·11	150·6	150·5
184	643·4	8·193	46·17	152·6	152·5
186	645·4	8·559	44·33	154·6	154·5
188	647·4	8·938	42·59	156·6	156·6
190	649·4	9·330	40·92	158·7	158·6
192	651·4	9·737	39·32	160·7	160·6
194	653·4	10·16	37·79	162·7	162·6
196	655·4	10·60	36·32	164·7	164·6
198	657·4	11·05	34·92	166·7	166·6
200	659·4	11·52	33·60	168·8	168·7
202	661·4	12·01	32·35	170·8	170·7
204	663·4	12·51	31·12	172·8	172·7
206	665·4	13·03	29·95	174·8	174·7
208	667·4	13·57	28·82	176·9	176·8
210	669·4	14·12	27·76	178·9	178·8
212	671·4	14·70	26·75	180·9	180·8
214	673·4	15·29	25·77	183·0	182·8
216	675·4	15·91	24·84	185·0	184·9
218	677·4	16·54	23·95	187·0	185·9
220	679·4	17·20	23·09	189·1	189·0

(continued).

FAHRENHEIT TEMPERATURE BASE.

Total heat of steam in B. Th. U. I.	Internal heat of steam in B. Th. U. E.	Latent heat of steam in B. Th. U. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Temperature in degrees Fahrenheit. T.
1125·9	1059·0	1005·5	0·2190	1·864	152
1126·8	1059·7	1004·4	0·2223	1·860	154
1127·7	1060·4	1003·3	0·2256	1·856	156
1128·6	1061·1	1002·2	0·2289	1·852	158
1129·4	1061·7	1001·0	0·2321	1·848	160
1130·3	1062·4	999·9	0·2354	1·844	162
1131·1	1063·1	998·7	0·2386	1·841	164
1132·0	1063·8	997·6	0·2418	1·837	166
1132·9	1064·5	996·4	0·2450	1·834	168
1133·8	1065·1	995·3	0·2482	1·830	170
1134·7	1065·8	994·1	0·2514	1·826	172
1135·5	1066·4	993·0	0·2546	1·823	174
1136·4	1067·1	991·8	0·2578	1·819	176
1137·2	1067·7	990·7	0·2610	1·816	178
1138·1	1068·4	989·5	0·2641	1·812	180
1138·9	1069·0	988·4	0·2672	1·809	182
1139·8	1069·7	987·2	0·2704	1·805	184
1140·6	1070·3	986·0	0·2735	1·802	186
1141·5	1071·0	984·8	0·2767	1·798	188
1142·3	1071·6	983·6	0·2798	1·795	190
1143·1	1072·2	982·5	0·2829	1·792	192
1144·0	1072·9	981·3	0·2860	1·788	194
1144·8	1073·5	980·1	0·2891	1·785	196
1145·7	1074·2	978·9	0·2922	1·781	198
1146·5	1074·8	977·7	0·2953	1·778	200
1147·3	1075·5	976·5	0·2984	1·774	202
1148·1	1076·1	975·3	0·3014	1·771	204
1148·9	1076·7	974·1	0·3045	1·768	206
1149·8	1077·3	972·9	0·3075	1·765	208
1150·6	1077·9	971·7	0·3106	1·762	210
1151·4	1078·6	970·5	0·3136	1·759	212
1152·2	1079·2	969·2	0·3166	1·756	214
1153·0	1079·8	968·0	0·3196	1·753	216
1153·8	1080·4	966·7	0·3226	1·750	218
1154·6	1081·0	965·5	0·3256	1·747	220

TABLE VI.

PROPERTIES OF SATURATED STEAM ON

Temperature in degrees Fahrenheit. T.	Absolute temperature in degrees Fahrenheit. θ.	Pressure in lbs. per square inch. p.	Specific volume in cubic feet per lb. V.	Total heat of water in B. Th. U. i.	Internal heat of water in B. Th. U. e.
222	681·4	17·87	22·29	191·1	191·0
224	683·4	18·57	21·50	193·1	193·0
226	685·4	19·29	20·74	195·2	195·1
228	687·4	20·04	20·03	197·2	197·1
230	689·4	20·80	19·34	199·2	199·1
232	691·4	21·59	18·68	201·3	201·2
234	693·4	22·40	18·05	203·3	203·2
236	695·4	23·23	17·43	205·3	205·2
238	697·4	24·10	16·84	207·4	207·2
240	699·4	25·00	16·29	209·4	209·3
242	701·4	25·92	15·74	211·4	211·3
244	703·4	26·87	15·23	213·5	213·4
246	705·4	27·84	14·74	215·5	215·4
248	707·4	28·84	14·25	217·6	217·5
250	709·4	29·87	13·79	219·6	219·5
252	711·4	30·94	13·34	221·6	221·5
254	713·4	32·03	12·91	223·7	223·6
256	715·4	33·16	12·50	225·7	225·6
258	717·4	34·31	12·10	227·8	227·6
260	719·4	35·50	11·73	229·8	229·7
262	721·4	36·73	11·36	231·8	231·7
264	723·4	37·98	11·01	233·9	233·7
266	725·4	39·27	10·67	235·9	235·8
268	727·4	40·59	10·34	238·0	237·8
270	729·4	41·95	10·03	240·0	239·9
272	731·4	43·35	9·730	242·0	241·9
274	733·4	44·79	9·434	244·1	243·9
276	735·4	46·25	9·150	246·1	246·0
278	737·4	47·86	8·881	248·2	248·0
280	739·4	49·32	8·620	250·2	250·1
282	741·4	50·91	8·367	252·3	252·1
284	743·4	52·55	8·123	254·3	254·2
286	745·4	54·23	7·887	256·4	256·2
288	747·4	55·95	7·660	258·4	258·3
290	749·4	57·71	7·441	260·5	260·3

(*continued*).

FAHRENHEIT TEMPERATURE BASE.

Total heat of steam in B. Th. U. I.	Internal heat of steam in B. Th. U. E.	Latent heat of steam in B. Th. U. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Temperature in degrees Fahrenheit. T.
1155·4	1081·6	964·3	0·3286	1·744	222
1156·1	1082·2	963·0	0·3315	1·741	224
1156·9	1082·8	961·8	0·3345	1·738	226
1157·7	1083·4	960·5	0·3374	1·735	228
1158·5	1084·0	959·3	0·3404	1·732	230
1159·3	1084·6	958·0	0·3434	1·729	232
1160·0	1085·2	956·8	0·3463	1·726	234
1160·8	1085·8	955·5	0·3492	1·723	236
1161·6	1086·4	954·2	0·3521	1·720	238
1162·3	1086·9	952·9	0·3550	1·717	240
1163·0	1087·5	951·6	0·3579	1·714	242
1163·8	1088·1	950·3	0·3608	1·711	244
1164·5	1088·7	949·0	0·3637	1·708	246
1165·3	1089·3	947·7	0·3665	1·706	248
1166·0	1089·8	946·4	0·3694	1·703	250
1166·7	1090·4	945·1	0·3723	1·700	252
1167·5	1090·9	943·8	0·3751	1·698	254
1168·2	1091·5	942·5	0·3780	1·695	256
1169·0	1092·0	941·2	0·3808	1·693	258
1169·7	1092·6	939·9	0·3837	1·690	260
1170·4	1093·2	938·6	0·3865	1·688	262
1171·2	1093·7	937·3	0·3894	1·685	264
1171·9	1094·3	935·9	0·3922	1·683	266
1172·6	1094·8	934·6	0·3950	1·680	268
1173·3	1095·4	933·3	0·3978	1·677	270
1174·0	1095·9	931·9	0·4006	1·675	272
1174·7	1096·4	930·6	0·4034	1·672	274
1175·3	1097·0	929·2	0·4062	1·670	276
1176·0	1097·5	927·9	0·4090	1·667	278
1176·7	1098·0	926·5	0·4117	1·665	280
1177·4	1098·5	925·1	0·4144	1·663	282
1178·0	1099·0	923·7	0·4172	1·660	284
1178·7	1099·5	922·3	0·4199	1·658	286
1179·3	1100·0	920·9	0·4227	1·655	288
1180·0	1100·5	919·5	0·4254	1·653	290

TABLE VI.

Properties of Saturated Steam on

Temperature in degrees Fahrenheit. T.	Absolute temperature in degrees Fahrenheit. θ.	Pressure in lbs. per square inch. p.	Specific volume in cubic feet per lb. V.	Total heat of water in B. Th. U. i.	Internal heat of water in B. Th. U. e.
292	751·4	59·52	7·230	262·5	262·4
294	753·4	61·36	7·026	264·6	264·4
296	755·4	63·27	6·828	266·6	266·5
298	757·4	65·21	6·637	268·7	268·5
300	759·4	67·20	6·453	270·8	270·6
302	761·4	69·24	6·274	272·8	272·6
304	763·4	71·35	6·103	274·9	274·7
306	765·4	73·48	5·936	276·9	276·7
308	767·4	75·67	5·774	279·0	278·8
310	769·4	77·91	5·619	281·1	280·8
312	771·4	80·20	5·470	283·1	282·8
314	773·4	82·55	5·326	285·2	284·9
316	775·4	84·96	5·183	287·2	286·9
318	777·4	87·42	5·046	289·3	289·0
320	779·4	89·93	4·911	291·4	291·1
322	781·4	92·51	4·780	293·4	293·1
324	783·4	95·14	4·654	295·5	295·2
326	785·4	97·83	4·536	297·6	297·3
328	787·4	100·6	4·422	299·6	299·3
330	789·4	103·4	4·309	301·7	301·4
332	791·4	106·3	4·201	303·8	303·5
334	793·4	109·2	4·095	305·9	305·6
336	795·4	112·2	3·990	307·9	307·6
338	797·4	115·2	3·891	310·0	309·7
340	799·4	118·3	3·795	312·1	311·7
342	801·4	121·5	3·702	314·2	313·8
344	803·4	124·8	3·610	316·2	315·8
346	805·4	128·1	3·521	318·3	317·9
348	807·4	131·5	3·436	320·4	320·0
350	809·4	135·0	3·353	322·5	322·1
352	811·4	138·6	3·273	324·6	324·1
354	813·4	142·2	3·195	326·6	326·2
356	815·4	145·9	3·118	328·7	328·3
358	817·4	149·7	3·043	330·8	330·4
360	819·4	153·5	2·972	332·9	332·4

(continued).

FAHRENHEIT TEMPERATURE BASE.

Total heat of steam in B. Th. U. I.	Internal heat of steam in B. Th. U. E.	Latent heat of steam in B. Th. U. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Temperature in degrees Fahrenheit. T.
1180·6	1101·0	918·1	0·4282	1·651	292
1181·3	1101·5	916·7	0·4309	1·648	294
1181·9	1102·0	915·3	0·4336	1·646	296
1182·6	1102·5	913·9	0·4363	1·643	298
1183·2	1102·9	912·4	0·4390	1·641	300
1183·8	1103·4	911·0	0·4417	1·638	302
1184·5	1103·9	909·6	0·4444	1·636	304
1185·1	1104·4	908·2	0·4471	1·634	306
1185·8	1104·9	906·7	0·4498	1·631	308
1186·4	1105·3	905·3	0·4525	1·629	310
1187·0	1105·8	903·9	0·4551	1·626	312
1187·6	1106·2	902·4	0·4578	1·624	314
1188·2	1106·7	901·0	0·4604	1·622	316
1188·8	1107·1	899·5	0·4631	1·620	318
1189·5	1107·6	898·1	0·4657	1·618	320
1190·1	1108·0	896·7	0·4684	1·615	322
1190·7	1108·5	895·2	0·4710	1·613	324
1191·3	1108·9	893·7	0·4736	1·611	326
1191·9	1109·4	892·2	0·4762	1·609	328
1192·4	1109·8	890·7	0·4788	1·607	330
1193·0	1110·2	889·2	0·4814	1·605	332
1193·6	1110·7	887·7	0·4840	1·603	334
1194·1	1111·1	886·2	0·4866	1·601	336
1194·7	1111·6	884·7	0·4892	1·599	338
1195·2	1112·0	883·1	0·4918	1·597	340
1195·8	1112·4	881·6	0·4944	1·594	342
1196·3	1112·8	880·0	0·4970	1·592	344
1196·8	1113·2	878·5	0·4996	1·590	346
1197·3	1113·6	876·9	0·5022	1·588	348
1197·8	1114·0	875·4	0·5047	1·586	350
1198·4	1114·4	873·8	0·5073	1·584	352
1198·9	1114·8	872·3	0·5098	1·582	354
1199·4	1115·2	870·7	0·5123	1·580	356
1200·0	1115·6	869·2	0·5149	1·578	358
1200·5	1116·0	867·6	0·5174	1·576	360

TABLE VI.

PROPERTIES OF SATURATED STEAM ON

Temperature in degrees Fahrenheit. T.	Absolute temperature in degrees Fahrenheit. θ.	Pressure in lbs. per square inch. p.	Specific volume in cubic feet per lb. V.	Total heat of water in B. Th. U. i.	Internal heat of water in B. Th. U. e.
362	821·4	157·4	2·903	335·0	334·5
364	823·4	161·4	2·835	337·1	336·6
366	825·4	165·5	2·770	339·2	338·7
368	827·4	169·6	2·708	341·3	340·8
370	829·4	173·8	2·644	343·3	342·8
372	831·4	178·1	2·584	345·4	344·9
374	833·4	182·6	2·524	347·5	346·9
376	835·4	187·0	2·468	349·6	349·0
378	837·4	191·6	2·412	351·7	351·1
380	839·4	196·3	2·358	353·8	353·2
382	841·4	201·0	2·305	355·9	355·3
384	843·4	205·8	2·254	358·0	357·4
386	845·4	210·8	2·204	360·1	359·5
388	847·4	215·8	2·157	362·2	361·6
390	849·4	220·8	2·110	364·3	363·7
392	851·4	226·0	2·064	366·4	365·8
394	853·4	231·3	2·020	368·5	367·9
396	855·4	236·7	1·977	370·6	370·0
398	857·4	242·2	1·934	372·7	372·1
400	859·4	247·7	1·893	374·8	374·2
402	861·4	253·4	1·852	377·0	376·3
404	863·4	259·2	1·813	379·1	378·4
406	865·4	265·1	1·775	381·2	380·4
408	867·4	271·1	1·738	383·3	382·5
410	869·4	277·2	1·703	385·4	384·6

(*continued*).

FAHRENHEIT TEMPERATURE BASE.

Total heat of steam in B. Th. U. I.	Internal heat of steam in B. Th. U. E.	Latent heat of steam in B. Th. U. L.	Entropy of water in ranks. ϕ_w.	Entropy of steam in ranks. ϕ_s.	Temperature in degrees Fahrenheit. T.
1201·0	1116·4	866·1	0·5200	1·574	362
1201·5	1116·8	864·5	0·5225	1·572	364
1202·0	1117·2	862·9	0·5250	1·570	366
1202·5	1117·6	861·3	0·5275	1·568	368
1203·0	1117·9	859·7	0·5300	1·567	370
1203·5	1118·3	858·1	0·5325	1·565	372
1204·0	1118·6	856·5	0·5350	1·563	374
1204·5	1119·0	854·9	0·5375	1·561	376
1205·0	1119·3	853·3	0·5400	1·559	378
1205·4	1119·7	851·6	0·5425	1·557	380
1205·9	1120·0	850·0	0·5450	1·555	382
1206·3	1120·4	848·3	0·5474	1·553	384
1206·8	1120·7	846·7	0·5499	1·551	386
1207·2	1121·1	845·0	0·5523	1·549	388
1207·7	1121·4	843·4	0·5548	1·548	390
1208·1	1121·7	841·7	0·5573	1·546	392
1208·6	1122·0	840·1	0·5597	1·544	394
1209·0	1122·3	838·4	0·5622	1·542	396
1209·4	1122·6	836·7	0·5646	1·540	398
1209·8	1122·9	835·0	0·5671	1·539	400
1210·3	1123·2	833·3	0·5695	1·537	402
1210·7	1123·5	831·6	0·5719	1·535	404
1211·1	1123·8	829·9	0·5744	1·533	406
1211·5	1124·1	828·2	0·5768	1·531	408
1211·9	1124·4	826·5	0·5792	1·530	410

NOTE ON TABLE VII.

For explanation of Table VII. see page 48, reading Fahrenheit for Centigrade.

TABLE VII.

Specific Heats of Superheated Steam at Various Temperatures (**FAHRENHEIT**) and Pressures.

Temperature T° F.	Pressure in lbs. per square inch.							
	20.	40.	60.	80.	100.	120.	140.	160.
227·8	0·508							
230	0·507							
240	0·506							
250	0·504							
260	0·503							
267·1		0·525						
270	0·501	0·524						
280	0·500	0·522						
290	0·498	0·519						
292·5			0·539					
300	0·497	0·517	0·536					
310	0·496	0·515	0·533					
311·8				0·551				
320	0·495	0·513	0·530	0·548				
327·6					0·562			
330	0·494	0·511	0·527	0·544	0·561			
340	0·493	0·509	0·524	0·540	0·556			
340·9						0·572		
350	0·492	0·507	0·522	0·537	0·552	0·567		
352·7							0·581	
360	0·491	0·506	0·520	0·534	0·548	0·563	0·577	
363·2								0·589

TABLE VII.

Specific Heats of Superheated Steam at Various

Temperature T° F.	Pressures in lbs. per square inch.							
	20.	40.	60.	80.	100.	120.	140.	160.
370	0·491	0·504	0·518	0·531	0·545	0·559	0·572	0·586
372·7								
380	0·490	0·503	0·516	0·529	0·541	0·554	0·567	0·580
381·6								
389·7								
390	0·489	0·501	0·514	0·526	0·538	0·550	0·562	0·574
397·2								
400	0·489	0·500	0·512	0·523	0·535	0·547	0·558	0·569
404·2								
410	0·488	0·499	0·510	0·521	0·532	0·543	0·554	0·565
410·9								
417·0								
420	0·488	0·498	0·508	0·519	0·530	0·540	0·551	0 561
440	0·487	0·496	0·505	0·515	0·525	0·534	0·544	0·553
460	0·486	0·494	0·503	0·512	0·520	0·529	0·538	0·546
480	0·485	0·493	0·501	0·509	0·516	0·524	0·532	0·540
500	0·484	0·491	0·499	0·506	0·513	0·520	0·527	0·535
520	0·484	0·490	0·497	0·503	0·510	0 517	0·523	0·530
540	0·483	0·489	0·495	0·501	0·507	0·513	0·519	0·525
560	0·483	0·488	0·494	0·499	0·505	0·510	0 516	0·521
580	0·482	0·487	0·492	0·497	0·502	0·507	0·513	0·518
600	0·482	0·486	0·491	0·496	0·500	0·505	0·510	0·515
620	0·481	0·486	0·490	0·494	0·499	0·503	0·507	0·512
640	0·481	0·485	0·489	0·493	0·497	0·501	0·505	0·509

(*continued*).

TEMPERATURES (**FAHRENHEIT**) AND PRESSURES (*continued*).

Pressures in lbs. per square inch.							Temperature T° F.
180.	200.	220.	240.	260.	280.	300.	
							370
0·597							372·7
0·593							380
	0·605						381·6
	—	0·611					389·7
0·587	0·599	0·611					390
			0·618				397·2
0·581	0 593	0·604	0·616				400
				0·624			404·2
0·576	0·587	0·598	0·609	0·620			410
					0·631		410·9
						0·637	417·0
0·572	0·582	0·593	0·603	0·614	0·624	0·635	420
0·563	0·572	0·582	0·591	0·601	0·610	0·620	440
0·555	0·564	0·572	0·581	0·589	0·598	0·607	460
0·548	0·556	0·563	0·571	0·579	0·587	0·595	480
0·542	0·549	0·556	0·563	0·570	0·577	0·585	500
0·536	0·543	0·550	0·556	0·562	0·569	0·576	520
0·531	0·537	0·544	0·549	0·555	0·562	0·567	540
0·527	0·532	0·538	0·543	0·549	0·555	0·560	560
0·523	0·528	0·533	0·538	0·543	0·548	0·553	580
0·519	0·524	0·529	0·533	0·538	0·542	0·547	600
0·516	0·520	0·525	0·529	0·533	0·537	0·542	620
0·513	0·517	0·521	0·525	0·529	0·533	0·537	640

TABLE VII.

Specific Heats of Superheated Steam at Various

Temperature. T° F.	Pressures in lbs. per square inch.							
	20.	40.	60.	80.	100.	120.	140.	160.
660	0·481	0·484	0·488	0·492	0·495	0·499	0·503	0·506
680	0·480	0·484	0·487	0·491	0·494	0·497	0·501	0·504
700	0·480	0·483	0·487	0·490	0·493	0·496	0·499	0·502
720	0·480	0·483	0·486	0·489	0·492	0·495	0·498	0·501
740	0·480	0·482	0·485	0·488	0·491	0·493	0·496	0·499
760	0·480	0·482	0 485	0·487	0·490	0·492	0·495	0·497
780	0·479	0·482	0·484	0·487	0·489	0·491	0·494	0·496
800	0·479	0·482	0·484	0·486	0·488	0·490	0·493	0·495
820	0·479	0·481	0·483	0 485	0·487	0·489	0·492	0·494
840	0·479	0·481	0·483	0·485	0·487	0·489	0·491	0·492
860	0·479	0·481	0·483	0·484	0·486	0·418	0·490	0·492
880	0·479	0·480	0·482	0·484	0·486	0·487	0·489	0·491
900	0·479	0·480	0·482	0·483	0·485	0·487	0·488	0·490
920	0·478	0·480	0·481	0·483	0·484	0·486	0·487	0·489
940	0·478	0·480	0·481	0·483	0·484	0·485	0·487	0·488
960	0·478	0·480	0·481	0·482	0·484	0·485	0·486	0·488
980	0·478	0·479	0·481	0·482	0·483	0·484	0·486	0·487
1000	0·478	0·479	0·481	0·482	0·483	0·484	0·485	0·486

(*continued*).

TEMPERATURES (**FAHRENHEIT**) AND PRESSURES (*continued*).

Pressures in lbs. per square inch.							Temperature T° F.
180.	200.	220.	240.	260.	280.	300.	
0·510	0·514	0·517	0·521	0·525	0·528	0·532	660
0·508	0·511	0·514	0·518	0·521	0·524	0·528	680
0·506	0·509	0·512	0·515	0·518	0·521	0·525	700
0·504	0·506	0·509	0·512	0·515	0·518	0·521	720
0·502	0·504	0·507	0·510	0·513	0·516	0·518	740
0·500	0·502	0·505	0·508	0·510	0·513	0·515	760
0·499	0·501	0·503	0·506	0·508	0·511	0·513	780
0·497	0·500	0·502	0·504	0·506	0·509	0·511	800
0·496	0·498	0·500	0·502	0·504	0·506	0·508	820
0·494	0·496	0·498	0·500	0·502	0·504	0·506	840
0·494	0·496	0·497	0·499	0·501	0·503	0·505	860
0·492	0·494	0·496	0·498	0·499	0·501	0·503	880
0·491	0·493	0·494	0·496	0·498	0·499	0·501	900
0·490	0·492	0·493	0·495	0·496	0·498	0·499	920
0·490	0·491	0·492	0·494	0·495	0·497	0·498	940
0·489	0·490	0·491	0·493	0·494	0·496	0·497	960
0·488	0·489	0·491	0·492	0·493	0·494	0·496	980
0·488	0·489	0·490	0·491	0·492	0·493	0·495	1000

NOTE ON TABLE VIII.

For explanation of Table VIII. see page 54, reading Fahrenheit for Centigrade.

TABLE VIII.

AVERAGE SPECIFIC HEATS OF SUPERHEATED STEAM FROM SATURATION TO TABULATED TEMPERATURES (**FAHRENHEIT**) AT VARIOUS PRESSURES.

Temperature T° F.	Pressures in lbs. per square inch.							
	20.	40.	60.	80.	100.	120.	140.	160.
227·8	0·508							
240	0·507							
260	0·505							
267·1		0·525						
280	0·504	0·524						
292·5			0·539					
300	0·502	0·521	0·538					
311·8				0·551				
320	0·501	0·519	0·535	0·549				
327·6					0·562			
340	0·500	0·517	0·532	0·545	0·559			
340·9						0·572		
352·7							0·581	
360	0·499	0·515	0·529	0·542	0·555	0·56	0·579	
363·2								0·589

TABLE VIII.

Average Specific Heats of Superheated Steam from at Various

Temperature T° F.	Pressures in lbs. per square inch.							
	20.	40.	60.	80.	100.	120.	140.	160.
372·7								
380	0·498	0·513	0·526	0·539	0·552	0·563	0·574	0·584
381·6								
389·7								
397·2								
400	0·497	0·511	0·524	0·536	0·548	0·559	0·569	0·579
404·2								
410·9								
417·0								
440	0·495	0·508	0·520	0·531	0·542	0·552	0·561	0·570
480	0·493	0·505	0·516	0·526	0·536	0·545	0·553	0·562
520	0·492	0·503	0·513	0·522	0·531	0·539	0·547	0·555
560	0·491	0·501	0·510	0·519	0·527	0·534	0·542	0·549
600	0·490	0·500	0·508	0·516	0·523	0·530	0·537	0·544
640	0·489	0·498	0·506	0·513	0·520	0·526	0·533	0·539
680	0·489	0·497	0·504	0·511	0·517	0·523	0·530	0·535
720	0·488	0·496	0·503	0·509	0·515	0·521	0·527	0·532
760	0·487	0·494	0·501	0·507	0·513	0·518	0·524	0·529
800	0·486	0·493	0·499	0·505	0·510	0·515	0·521	0·526
840	0·486	0·492	0·498	0·503	0·508	0·513	0·518	0·523
880	0·486	0·491	0·497	0·501	0·506	0·511	0·516	0·520
920	0·485	0·491	0·496	0·500	0·505	0·509	0·514	0·518
960	0·485	0·490	0·495	0·499	0·503	0·507	0·512	0·516
1000	0·485	0·490	0·494	0·498	0·502	0·506	0·510	0·514

(continued).

SATURATION TO TABULATED TEMPERATURES (**FAHRENHEIT**)

PRESSURES *(continued).*

Pressures in lbs. per square inch.							Temperature To F.
180.	200.	220.	240.	260.	280.	300.	
0·597							372·7
0 594							380
	0·605						381·6
		0·611					389·7
			0·618				397·2
0·589	0·599	0·608	0·617				400
				0·624			404·2
					0·631		410·9
						0·637	417·0
0·579	0·588	0·596	0·604	0·613	0·621	0·629	440
0·570	0·578	0·586	0·593	0·601	0·608	0·615	480
0·563	0·570	0·577	0·584	0·591	0·597	0·604	520
0·556	0·563	0·569	0·576	0·582	0·588	0·594	560
0 550	0·556	0·562	0·568	0·574	0·579	0·585	600
0·545	0·551	0·557	0·562	0·567	0·572	0·577	640
0·540	0·546	0·551	0·556	0·561	0·566	0·570	680
0·537	0·542	0·546	0·551	0·556	0·560	0·564	720
0·533	0·538	0·542	0·546	0·551	0·555	0·559	760
0·530	0·534	0·538	0·542	0·546	0·551	0·555	800
0·527	0·531	0 534	0·538	0·542	0·546	0·550	840
0·524	0·528	0·531	0·535	0·539	0·542	0·546	880
0·522	0·526	0·529	0·532	0·536	0·539	0·542	920
0·520	0·523	0·526	0·529	0·533	0·536	0·539	960
0·518	0·521	0·524	0·527	0·530	0·533	0·536	1000

TABLE

Logarithms.

	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
10	0000	0043	0086	0128	0170	0212	0253	0294	0334	0374	4	9	13	17	21	26	30	34	38
											4	8	12	16	20	24	28	32	37
11	0414	0453	0492	0531	0569	0607	0645	0682	0719	0755	4	8	12	15	19	23	27	31	35
											4	7	11	15	19	22	26	30	33
12	0792	0828	0864	0899	0934	0969	1004	1038	1072	1106	3	7	11	14	18	21	25	28	32
											3	7	10	14	17	20	24	27	31
13	1139	1173	1206	1239	1271	1303	1335	1367	1399	1430	3	7	10	13	16	20	23	26	30
											3	7	10	12	16	19	22	25	29
14	1461	1492	1523	1553	1584	1614	1644	1673	1703	1732	3	6	9	12	15	18	21	24	28
											3	6	9	12	15	17	20	23	26
15	1761	1790	1818	1847	1875	1903	1931	1959	1987	2014	3	6	9	11	14	17	20	23	26
											3	5	8	11	14	16	19	22	25
16	2041	2068	2095	2122	2148	2175	2201	2227	2253	2279	3	5	8	11	14	16	19	22	24
											3	5	8	10	13	15	18	21	23
17	2304	2330	2355	2380	2405	2430	2455	2480	2504	2529	3	5	8	10	13	15	18	20	23
											2	5	7	10	12	15	17	19	22
18	2553	2577	2601	2625	2648	2672	2695	2718	2742	2765	2	5	7	9	12	14	16	19	21
											2	5	7	9	11	14	16	18	21
19	2788	2810	2833	2856	2878	2900	2923	2945	2967	2989	2	4	7	9	11	13	16	18	20
											2	4	6	8	11	13	15	17	19
20	3010	3032	3054	3075	3096	3118	3139	3160	3181	3201	2	4	6	8	11	13	15	17	19
21	3222	3243	3263	3284	3304	3324	3345	3365	3385	3404	2	4	6	8	10	12	14	16	18
22	3424	3444	3464	3483	3502	3522	3541	3560	3579	3598	2	4	6	8	10	12	14	15	17
23	3617	3636	3655	3674	3692	3711	3729	3747	3766	3784	2	4	6	7	9	11	13	15	17
24	3802	3820	3838	3856	3874	3892	3909	3927	3945	3962	2	4	5	7	9	11	12	14	16
25	3979	3997	4014	4031	4048	4065	4082	4099	4116	4133	2	3	5	7	9	10	12	14	15
26	4150	4166	4183	4200	4216	4232	4249	4265	4281	4298	2	3	5	7	8	10	11	13	15
27	4314	4330	4346	4362	4378	4393	4409	4425	4440	4456	2	3	5	6	8	9	11	13	14
28	4472	4487	4502	4518	4533	4548	4564	4579	4594	4609	2	3	5	6	8	9	11	12	14
29	4624	4639	4654	4669	4683	4698	4713	4728	4742	4757	1	3	4	6	7	9	10	12	13
30	4771	4786	4800	4814	4829	4843	4857	4871	4886	4900	1	3	4	6	7	9	10	11	13
31	4914	4928	4942	4955	4969	4983	4997	5011	5024	5038	1	3	4	6	7	8	10	11	12
32	5051	5065	5079	5092	5105	5119	5132	5145	5159	5172	1	3	4	5	7	8	9	11	12
33	5185	5198	5211	5224	5237	5250	5263	5276	5289	5302	1	3	4	5	6	8	9	10	12
34	5315	5328	5340	5353	5366	5378	5391	5403	5416	5428	1	3	4	5	6	8	9	10	11
35	5441	5453	5465	5478	5490	5502	5514	5527	5539	5551	1	2	4	5	6	7	9	10	11
36	5563	5575	5587	5599	5611	5623	5635	5647	5658	5670	1	2	4	5	6	7	8	10	11
37	5682	5694	5705	5717	5729	5740	5752	5763	5775	5786	1	2	3	5	6	7	8	9	10
38	5798	5809	5821	5832	5843	5855	5866	5877	5888	5899	1	2	3	5	6	7	8	9	10
39	5911	5922	5933	5944	5955	5966	5977	5988	5999	6010	1	2	3	4	5	7	8	9	10
40	6021	6031	6042	6053	6064	6075	6085	6096	6107	6117	1	2	3	4	5	6	8	9	10
41	6128	6138	6149	6160	6170	6180	6191	6201	6212	6222	1	2	3	4	5	6	7	8	9
42	6232	6243	6253	6263	6274	6284	6294	6304	6314	6325	1	2	3	4	5	6	7	8	9
43	6335	6345	6355	6365	6375	6385	6395	6405	6415	6425	1	2	3	4	5	6	7	8	9
44	6435	6444	6454	6464	6474	6484	6493	6503	6513	6522	1	2	3	4	5	6	7	8	9
45	6532	6542	6551	6561	6571	6580	6590	6599	6609	6618	1	2	3	4	5	6	7	8	9
46	6628	6637	6646	6656	6665	6675	6684	6693	6702	6712	1	2	3	4	5	6	7	7	8
47	6721	6730	6739	6749	6758	6767	6776	6785	6794	6803	1	2	3	4	5	5	6	7	8
48	6812	6821	6830	6839	6848	6857	6866	6875	6884	6893	1	2	3	4	4	5	6	7	8
49	6902	6911	6920	6928	6937	6946	6955	6964	6972	6981	1	2	3	4	4	5	6	7	8
50	6990	6998	7007	7016	7024	7033	7042	7050	7059	7067	1	2	3	3	4	5	6	7	8

IX.

Logarithms.

	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
51	7076	7084	7093	7101	7110	7118	7126	7135	7143	7152	1	2	3	3	4	5	6	7	8
52	7160	7168	7177	7185	7193	7202	7210	7218	7226	7235	1	2	2	3	4	5	6	7	7
53	7243	7251	7259	7267	7275	7284	7292	7300	7308	7316	1	2	2	3	4	5	6	6	7
54	7324	7332	7340	7348	7356	7364	7372	7380	7388	7396	1	2	2	3	4	5	6	6	7
55	7404	7412	7419	7427	7435	7443	7451	7459	7466	7474	1	2	2	3	4	5	5	6	7
56	7482	7490	7497	7505	7513	7520	7528	7536	7543	7551	1	2	2	3	4	5	5	6	7
57	7559	7566	7574	7582	7589	7597	7604	7612	7619	7627	1	2	2	3	4	5	5	6	7
58	7634	7642	7649	7657	7664	7672	7679	7686	7694	7701	1	1	2	3	4	4	5	6	7
59	7709	7716	7723	7731	7738	7745	7752	7760	7767	7774	1	1	2	3	4	4	5	6	7
60	7782	7789	7796	7803	7810	7818	7825	7832	7839	7846	1	1	2	3	4	4	5	6	6
61	7853	7860	7868	7875	7882	7889	7896	7903	7910	7917	1	1	2	3	4	4	5	6	6
62	7924	7931	7938	7945	7952	7959	7966	7973	7980	7987	1	1	2	3	3	4	5	6	6
63	7993	8000	8007	8014	8021	8028	8035	8041	8048	8055	1	1	2	3	3	4	5	5	6
64	8062	8069	8075	8082	8089	8096	8102	8109	8116	8122	1	1	2	3	3	4	5	5	6
65	8129	8136	8142	8149	8156	8162	8169	8176	8182	8189	1	1	2	3	3	4	5	5	6
66	8195	8202	8209	8215	8222	8228	8235	8241	8248	8254	1	1	2	3	3	4	5	5	6
67	8261	8267	8274	8280	8287	8293	8299	8306	8312	8319	1	1	2	3	3	4	5	5	6
68	8325	8331	8338	8344	8351	8357	8363	8370	8376	8382	1	1	2	3	3	4	4	5	6
69	8388	8395	8401	8407	8414	8420	8426	8432	8439	8445	1	1	2	2	3	4	4	5	6
70	8451	8457	8463	8470	8476	8482	8488	8494	8500	8506	1	1	2	2	3	4	4	5	6
71	8513	8519	8525	8531	8537	8543	8549	8555	8561	8567	1	1	2	2	3	4	4	5	5
72	8573	8579	8585	8591	8597	8603	8609	8615	8621	8627	1	1	2	2	3	4	4	5	5
73	8633	8639	8645	8651	8657	8663	8669	8675	8681	8686	1	1	2	2	3	4	4	5	5
74	8692	8698	8704	8710	8716	8722	8727	8733	8739	8745	1	1	2	2	3	4	4	5	5
75	8751	8756	8762	8768	8774	8779	8785	8791	8797	8802	1	1	2	2	3	3	4	5	5
76	8808	8814	8820	8825	8831	8837	8842	8848	8854	8859	1	1	2	2	3	3	4	5	5
77	8865	8871	8876	8882	8887	8893	8899	8904	8910	8915	1	1	2	2	3	3	4	4	5
78	8921	8927	8932	8938	8943	8949	8954	8960	8965	8971	1	1	2	2	3	3	4	4	5
79	8976	8982	8987	8993	8998	9004	9009	9015	9020	9025	1	1	2	2	3	3	4	4	5
80	9031	9036	9042	9047	9053	9058	9063	9069	9074	9079	1	1	2	2	3	3	4	4	5
81	9085	9090	9096	9101	9106	9112	9117	9122	9128	9133	1	1	2	2	3	3	4	4	5
82	9138	9143	9149	9154	9159	9165	9170	9175	9180	9186	1	1	2	2	3	3	4	4	5
83	9191	9196	9201	9206	9212	9217	9222	9227	9232	9238	1	1	2	2	3	3	4	4	5
84	9243	9248	9253	9258	9263	9269	9274	9279	9284	9289	1	1	2	2	3	3	4	4	5
85	9294	9299	9304	9309	9315	9320	9325	9330	9335	9340	1	1	2	2	3	3	4	4	5
86	9345	9350	9355	9360	9365	9370	9375	9380	9385	9390	1	1	2	2	3	3	4	4	5
87	9395	9400	9405	9410	9415	9420	9425	9430	9435	9440	0	1	1	2	2	3	3	4	4
88	9445	9450	9455	9460	9465	9469	9474	9479	9484	9489	0	1	1	2	2	3	3	4	4
89	9494	9499	9504	9509	9513	9518	9523	9528	9533	9538	0	1	1	2	2	3	3	4	4
90	9542	9547	9552	9557	9562	9566	9571	9576	9581	9586	0	1	1	2	2	3	3	4	4
91	9590	9595	9600	9605	9609	9614	9619	9624	9628	9633	0	1	1	2	2	3	3	4	4
92	9638	9643	9647	9652	9657	9661	9666	9671	9675	9680	0	1	1	2	2	3	3	4	4
93	9685	9689	9694	9699	9703	9708	9713	9717	9722	9727	0	1	1	2	2	3	3	4	4
94	9731	9736	9741	9745	9750	9754	9759	9763	9768	9773	0	1	1	2	2	3	3	4	4
95	9777	9782	9786	9791	9795	9800	9805	9809	9814	9818	0	1	1	2	2	3	3	4	4
96	9823	9827	9832	9836	9841	9845	9850	9854	9859	9863	0	1	1	2	2	3	3	4	4
97	9868	9872	9877	9881	9886	9890	9894	9899	9903	9908	0	1	1	2	2	3	3	4	4
98	9912	9917	9921	9926	9930	9934	9939	9943	9948	9952	0	1	1	2	2	3	3	4	4
99	9956	9961	9965	9969	9974	9978	9983	9987	9991	9996	0	1	1	2	2	3	3	3	4

TABLE IX.

ANTILOGARITHMS.

	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
·00	1000	1002	1005	1007	1009	1012	1014	1016	1019	1021	0	0	1	1	1	1	2	2	2
·01	1023	1026	1028	1030	1033	1035	1038	1040	1042	1045	0	0	1	1	1	1	2	2	2
·02	1047	1050	1052	1054	1057	1059	1062	1064	1067	1069	0	0	1	1	1	1	2	2	2
·03	1072	1074	1076	1079	1081	1084	1086	1089	1091	1094	0	0	1	1	1	1	2	2	3
·04	1096	1099	1102	1104	1107	1109	1112	1114	1117	1119	0	1	1	1	1	2	2	2	2
·05	1122	1125	1127	1130	1132	1135	1138	1140	1143	1146	0	1	1	1	1	2	2	2	2
·06	1148	1151	1153	1156	1159	1161	1164	1167	1169	1172	0	1	1	1	1	2	2	2	2
·07	1175	1178	1180	1183	1186	1189	1191	1194	1197	1199	0	1	1	1	1	2	2	2	2
·08	1202	1205	1208	1211	1213	1216	1219	1222	1225	1227	0	1	1	1	1	2	2	2	3
·09	1230	1233	1236	1239	1242	1245	1247	1250	1253	1256	0	1	1	1	1	2	2	2	3
·10	1259	1262	1265	1268	1271	1274	1276	1279	1282	1285	0	1	1	1	1	2	2	2	3
·11	1288	1291	1294	1297	1300	1303	1306	1309	1312	1315	0	1	1	1	2	2	2	2	3
·12	1318	1321	1324	1327	1330	1334	1337	1340	1343	1346	0	1	1	1	2	2	2	2	3
·13	1349	1352	1355	1358	1361	1365	1368	1371	1374	1377	0	1	1	1	2	2	2	3	3
·14	1380	1384	1387	1390	1393	1396	1400	1403	1406	1409	0	1	1	1	2	2	2	3	3
·15	1413	1416	1419	1422	1426	1429	1432	1435	1439	1442	0	1	1	1	2	2	2	3	3
·16	1445	1449	1452	1455	1459	1462	1466	1469	1472	1476	0	1	1	1	2	2	2	3	3
·17	1479	1483	1486	1489	1493	1496	1500	1503	1507	1510	0	1	1	1	2	2	2	3	3
·18	1514	1517	1521	1524	1528	1531	1535	1538	1542	1545	0	1	1	1	2	2	2	3	3
·19	1549	1552	1556	1560	1563	1567	1570	1574	1578	1581	0	1	1	1	2	2	3	3	3
·20	1585	1589	1592	1596	1600	1603	1607	1611	1614	1618	0	1	1	1	2	2	3	3	3
·21	1622	1626	1629	1633	1637	1641	1644	1648	1652	1656	0	1	1	2	2	2	3	3	3
·22	1660	1663	1667	1671	1675	1679	1683	1687	1690	1694	0	1	1	2	2	2	3	3	3
·23	1698	1702	1706	1710	1714	1718	1722	1726	1730	1734	0	1	1	2	2	2	3	3	4
·24	1738	1742	1746	1750	1754	1758	1762	1766	1770	1774	0	1	1	2	2	2	3	3	4
·25	1778	1782	1786	1791	1795	1799	1803	1807	1811	1816	0	1	1	2	2	2	3	3	4
·26	1820	1824	1828	1832	1837	1841	1845	1849	1854	1858	0	1	1	2	2	3	3	3	4
·27	1862	1866	1871	1875	1879	1884	1888	1892	1897	1901	0	1	1	2	2	3	3	3	4
·28	1905	1910	1914	1919	1923	1928	1932	1936	1941	1945	0	1	1	2	2	3	3	4	4
·29	1950	1954	1959	1963	1968	1972	1977	1982	1986	1991	0	1	1	2	2	3	3	4	4
·30	1995	2000	2004	2009	2014	2018	2023	2028	2032	2037	0	1	1	2	2	3	3	4	4
·31	2042	2046	2051	2056	2061	2065	2070	2075	2080	2084	0	1	1	2	2	3	3	4	4
·32	2089	2094	2099	2104	2109	2113	2118	2123	2128	2133	0	1	1	2	2	3	3	4	4
·33	2138	2143	2148	2153	2158	2163	2168	2173	2178	2183	0	1	1	2	2	3	3	4	4
·34	2188	2193	2198	2203	2208	2213	2218	2223	2228	2234	1	1	2	2	3	3	4	4	5
·35	2239	2244	2249	2254	2259	2265	2270	2275	2280	2286	1	1	2	2	3	3	4	4	5
·36	2291	2296	2301	2307	2312	2317	2323	2328	2333	2339	1	1	2	2	3	3	4	4	5
·37	2344	2350	2355	2360	2366	2371	2377	2382	2388	2393	1	1	2	2	3	3	4	4	5
·38	2399	2404	2410	2415	2421	2427	2432	2438	2443	2449	1	1	2	2	3	3	4	4	5
·39	2455	2460	2466	2472	2477	2483	2489	2495	2500	2506	1	1	2	2	3	3	4	5	5
·40	2512	2518	2523	2529	2535	2541	2547	2553	2559	2564	1	1	2	2	3	4	4	5	5
·41	2570	2576	2582	2588	2594	2600	2606	2612	2618	2624	1	1	2	2	3	4	4	5	5
·42	2630	2636	2642	2649	2655	2661	2667	2673	2679	2685	1	1	2	2	3	4	4	5	6
·43	2692	2698	2704	2710	2716	2723	2729	2735	2742	2748	1	1	2	3	3	4	4	5	6
·44	2754	2761	2767	2770	2780	2786	2793	2799	2805	2812	1	1	2	3	3	4	4	5	6
·45	2818	2825	2831	2838	2844	2851	2858	2864	2871	2877	1	1	2	3	3	4	5	5	6
·46	2884	2891	2897	2904	2911	2917	2924	2931	2938	2944	1	1	2	3	3	4	5	5	6
·47	2951	2958	2965	2972	2979	2985	2992	2999	3006	3013	1	1	2	3	3	4	5	5	6
·48	3020	3027	3034	3041	3048	3055	3062	3069	3076	3083	1	1	2	3	4	4	5	6	6
·49	3090	3097	3105	3112	3119	3126	3133	3141	3148	3155	1	1	2	3	4	4	5	6	6

(*continued*).

ANTILOGARITHMS.

	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
·50	3162	3170	3177	3184	3192	3199	3206	3214	3221	3228	1	1	2	3	4	4	5	6	7
·51	3236	3243	3251	3258	3266	3273	3281	3289	3296	3304	1	2	2	3	4	5	5	6	7
·52	3311	3319	3327	3334	3342	3350	3357	3365	3373	3381	1	2	2	3	4	5	5	6	7
·53	3388	3396	3404	3412	3420	3428	3436	3443	3451	3459	1	2	2	3	4	5	6	6	7
·54	3467	3475	3483	3491	3499	3508	3516	3524	3532	3540	1	2	2	3	4	5	6	6	7
·55	3548	3556	3565	3573	3581	3589	3597	3606	3614	3622	1	2	2	3	4	5	6	7	7
·56	3631	3639	3648	3656	3664	3673	3681	3690	3698	3707	1	2	3	3	4	5	6	7	8
·57	3715	3724	3733	3741	3750	3758	3767	3776	3784	3793	1	2	3	3	4	5	6	7	8
·58	3802	3811	3819	3828	3837	3846	3855	3864	3873	3882	1	2	3	4	4	5	6	7	8
·59	3890	3899	3908	3917	3926	3936	3945	3954	3963	3972	1	2	3	4	5	5	6	7	8
·60	3981	3990	3999	4009	4018	4027	4036	4046	4055	4064	1	2	3	4	5	6	6	7	8
·61	4074	4083	4093	4102	4111	4121	4130	4140	4150	4159	1	2	3	4	5	6	7	8	9
·62	4169	4178	4188	4198	4207	4217	4227	4236	4246	4256	1	2	3	4	5	6	7	8	9
·63	4266	4276	4285	4295	4305	4315	4325	4335	4345	4355	1	2	3	4	5	6	7	8	9
·64	4365	4375	4385	4395	4406	4416	4426	4436	4446	4457	1	2	3	4	5	6	7	8	9
·65	4467	4477	4487	4498	4508	4519	4529	4539	4550	4560	1	2	3	4	5	6	7	8	9
·66	4571	4581	4592	4603	4613	4624	4634	4645	4656	4667	1	2	3	4	5	6	7	9	10
·67	4677	4688	4699	4710	4721	4732	4742	4753	4764	4775	1	2	3	4	5	7	8	9	10
·68	4786	4797	4808	4819	4831	4842	4853	4864	4875	4887	1	2	3	4	6	7	8	9	10
·69	4898	4909	4920	4932	4943	4955	4966	4977	4989	5000	1	2	3	5	6	7	8	9	10
·70	5012	5023	5035	5047	5058	5070	5082	5093	5105	5117	1	2	4	5	6	7	8	9	11
·71	5129	5140	5152	5164	5176	5188	5200	5212	5224	5236	1	2	4	5	6	7	8	10	11
·72	5248	5260	5272	5284	5297	5309	5321	5333	5346	5358	1	2	4	5	6	7	9	10	11
·73	5370	5383	5395	5408	5420	5433	5445	5458	5470	5483	1	3	4	5	6	8	9	10	11
·74	5495	5508	5521	5534	5546	5559	5572	5585	5598	5610	1	3	4	5	6	8	9	10	12
·75	5623	5636	5649	5662	5675	5689	5702	5715	5728	5741	1	3	4	5	7	8	9	10	12
·76	5754	5768	5781	5794	5808	5821	5834	5848	5861	5875	1	3	4	5	7	8	9	11	12
·77	5888	5902	5916	5929	5943	5957	5970	5984	5998	6012	1	3	4	5	7	8	10	11	12
·78	6026	6039	6053	6067	6081	6095	6109	6124	6138	6152	1	3	4	6	7	8	10	11	13
·79	6166	6180	6194	6209	6223	6237	6252	6266	6281	6295	1	3	4	6	7	9	10	11	13
·80	6310	6324	6339	6353	6368	6383	6397	6412	6427	6442	1	3	4	6	7	9	10	12	13
·81	6457	6471	6486	6501	6516	6531	6546	6561	6577	6592	2	3	5	6	8	9	11	12	14
·82	6607	6622	6637	6653	6668	6683	6699	6714	6730	6745	2	3	5	6	8	9	11	12	14
·83	6761	6776	6792	6808	6823	6839	6855	6871	6887	6902	2	3	5	6	8	9	11	13	14
·84	6918	6934	6950	6966	6982	6998	7015	7031	7047	7063	2	3	5	6	8	10	11	13	15
·85	7079	7096	7112	7129	7145	7161	7178	7194	7211	7228	2	3	5	7	8	10	12	13	15
·86	7244	7261	7278	7295	7311	7328	7345	7362	7379	7396	2	3	5	7	8	10	12	13	15
·87	7413	7430	7447	7464	7482	7499	7516	7534	7551	7568	2	3	5	7	9	10	12	14	16
·88	7586	7603	7621	7638	7656	7674	7691	7709	7727	7745	2	4	5	7	9	11	12	14	16
·89	7762	7780	7798	7816	7834	7852	7870	7889	7907	7925	2	4	5	7	9	11	13	14	16
·90	7943	7962	7980	7998	8017	8035	8054	8072	8091	8110	2	4	6	7	9	11	13	15	17
·91	8128	8147	8166	8185	8204	8222	8241	8260	8279	8299	2	4	6	8	9	11	13	15	17
·92	8318	8337	8356	8375	8395	8414	8433	8453	8472	8492	2	4	6	8	10	12	14	15	17
·93	8511	8531	8551	8570	8590	8610	8630	8650	8670	8690	2	4	6	8	10	12	14	16	18
·94	8710	8730	8750	8770	8790	8810	8831	8851	8872	8892	2	4	6	8	10	12	14	16	18
·95	8913	8933	8954	8974	8995	9016	9036	9057	9078	9099	2	4	6	8	10	12	15	17	19
·96	9120	9141	9162	9183	9204	9226	9247	9268	9290	9311	2	4	6	8	11	13	15	17	19
·97	9333	9354	9376	9397	9419	9441	9462	9484	9506	9528	2	4	7	9	11	13	15	17	20
·98	9550	9572	9594	9616	9638	9661	9683	9705	9727	9750	2	4	7	9	11	13	16	18	20
·99	9772	9795	9817	9840	9863	9886	9908	9931	9954	9977	2	5	7	9	11	14	16	18	20

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